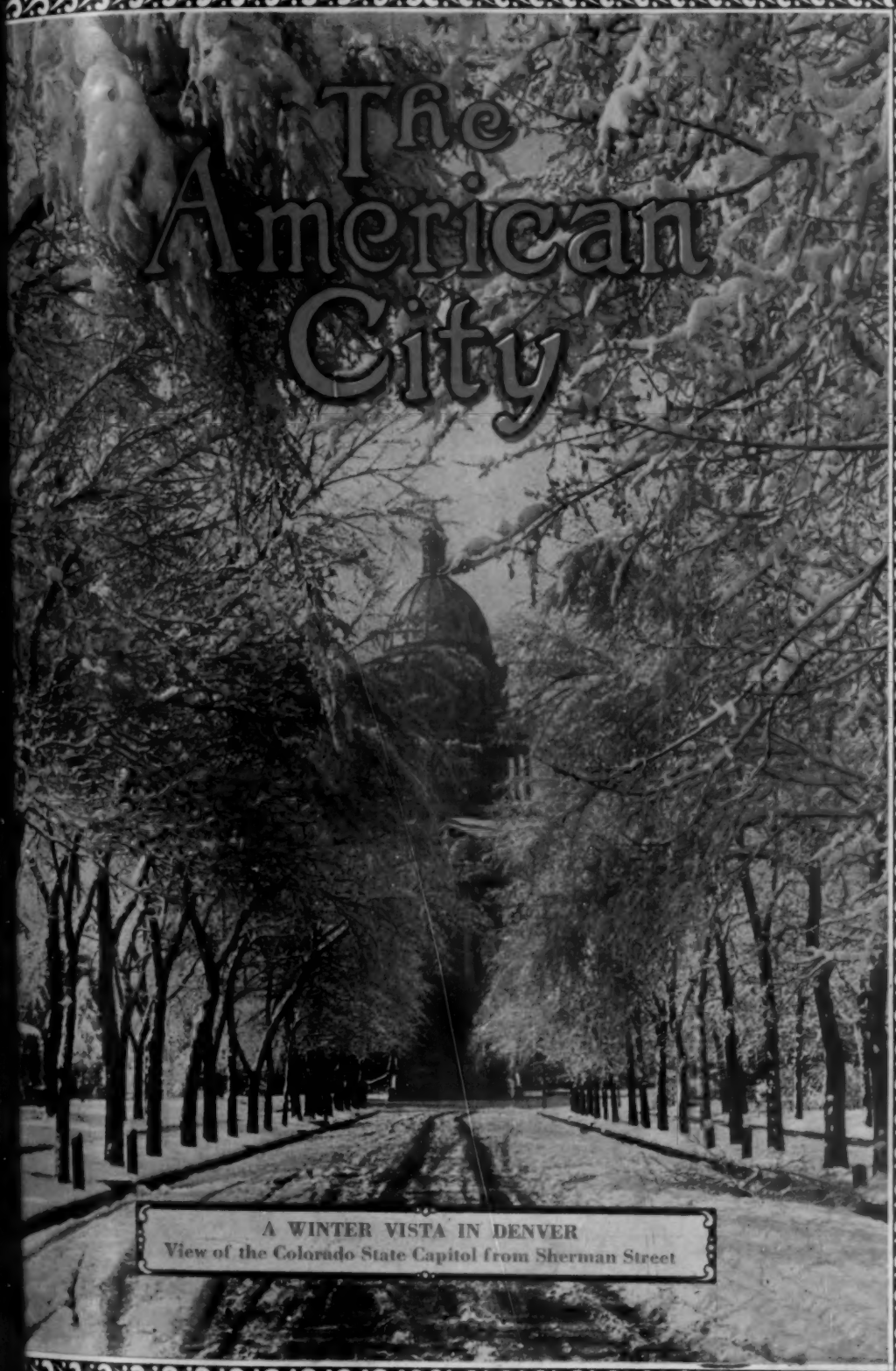
LIBRARY
MICH.
ember, 1924

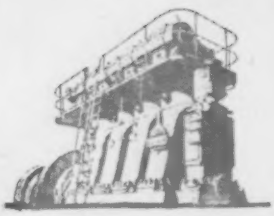
Vol. XXXI No. 6
50 Cents $4 a Year

The American City



A WINTER VISTA IN DENVER
View of the Colorado State Capitol from Sherman Street

Savings in Labor Dollars



The same amount of money which, ten years ago, would pay four men's wages in your power plant, will pay only two men today. And all the increase in power cost cannot be passed on to the consumer in higher prices. Industry must meet the situation by increasing power output per labor dollar.

Many central stations and power plants are doing this by using the labor-saving Fulton-Diesel. In municipal water and power plants of various sizes, on which we are quoting operating reports, the entire operating force, exclusive of supervision, consists of:

Power Plant and Water Works	525-H.P. Fulton-Diesel	1 watch engineer for each shift.
Power Plant, Water Works and Filtration Plant	579-H.P.	1 watch engineer and helper for each shift.
Power Plant and Ice Plant	360-H.P. Fulton-Diesel 300-K.V.A. Turbine	1 watch engineer for each shift.
Power Plant and Water Works	1085-H.P. Fulton-Diesel	1 watch engineer and oiler for each shift.

You have—or will have—a labor cost situation that only the Fulton-Diesel can meet satisfactorily. Call on our engineering staff to help you plan the way. They are freely at your service, anywhere and at any time, without obligation. And ask us to send you—also free and postpaid—the Fulton-Diesel book that tells the full story of all the other wonderful economies and high efficiency of this engine.

FULTON IRON WORKS COMPANY, ST. LOUIS, U. S. A.

Successful engine builders for over seventy years

BRANCH OFFICES:

New York—82 Wall St.
New Orleans, La.—Hibernia Bank Bldg.
Dallas, Texas—Praetorian Bldg.
Havana, Cuba—401-402-403 Banco Nacional

FULTON-DIESEL

VOL. XXXI No. 6 THE AMERICAN CITY, December, 1924 Price, 50 Cents; $4 a Year
Entered as second-class matter, July 29, 1910, at the Post Office at New York, N. Y., under Act of March 3, 1879
Issued Monthly by The Civic Press, 443 Fourth Ave., New York Printed in U. S. A.

Vol. XXXI
No. 6

The American City Magazine

DECEMBER
1924

443 Fourth Ave.
NEW YORK

50 Cents
$4 a Year

Fields of Progressive Legislation for Better City Planning

By Edward M. Bassett

Counsel of Zoning Committee of New York; Director of Legal Division of Regional Plan of New York and Its Environs

Zoning Enabling Acts

A NUMBER of states have either defective enabling acts for zoning or else none at all. Municipalities cannot safely be zoned without a state enabling act. Where possible, a single enabling act should apply to all municipalities in the state. The Department of Commerce, Washington, D. C., will supply an excellent standard law and other informative material. The most usual shortcomings of existing acts are the omission to authorize zoning of density of population, the omission of the requirement of more than a majority of the votes of the council where amendments of the maps are opposed by a considerable fraction of the landowners, and the omission of a provision for a board of appeals with power to vary the strict letter of the law in cases of particular permits. Several states, in which people complain bitterly that their courts are against zoning, have never had a proper enabling act for zoning.

Local Planning Commissions and State Bureaus

How about legislation to establish city plan commissions? We must not forget that councils, town boards and city engineers have been doing city planning for centuries. Some of it has been excellent and some has been pretty poor. Regardless of state legislative devices, the elected local legislators are, in the long run, the ones who will make and carry out city plans. They hold the purse and they cannot be blamed if they do not like to surrender it to appointed officials. On the other hand, better city planning is needed. States should help councils, not by taking the city planning power out of their hands, but by permitting the establishment of local advisory bodies with a paid staff. State conferences of such advisory bodies stimulate the best sort of city and regional planning. States can well establish

Profiting by Experience and Intelligence

During 1925 the Legislatures of not less than 42 of the 48 states will be in session. To each of these law-making bodies there is opportunity for important public service in the enactment of legislation needed for local and regional progress in city planning and zoning.

A great deal of such legislation in past years has necessarily proceeded by the clumsy method of "trial and error." But practical experience in the operation of these statutes, combined with the studies of eminent lawyers, has now made available advice which has passed far beyond the stage of mere theory. THE AMERICAN CITY has been fortunate in securing, from one of the foremost of these experts in the law of city and regional planning and zoning, the article here published. The suggestions offered by Mr. Bassett will be of great practical value, we are sure, to all who are drafting or desirous of influencing the passage of laws which will help our growing communities to control wisely their physical development.

bureaus supported by state funds to advise municipalities on planning. Massachusetts and Pennsylvania have taken the lead in this direction. In many states, small municipalities have no place to turn to for professional advice and help. A central state bureau can serve many cities and villages which if left to themselves do not know how to do or whom to employ, and so they do nothing.

Planning Beyond the City's Limits

Some cities have been given the power to extend the city plan beyond the city limits. The desirability of this power seems evident, because the street and park system beyond the city limits ought to harmonize with the city plan. Many insist that this power should be given to all cities of a state by general legislation. It would, however, be more discriminating to give this power to cities only where they are not contiguous to other cities or villages. For instance, New York and Yonkers are contiguous. If the State Legislature empowered all cities to lay out streets and parks three miles beyond the city limits, Yonkers would have as much right to plan a northern zone of New York as New York would have to plan a southern zone of Yonkers. We can imagine the indignation of villages around Boston, Chicago and Philadelphia if the big city tried to impose its city plan on them without their consent. Home rule is desired by every competent municipipality, and the best sort of city planning will recognize this trait of human nature. But no municipality objects to cooperation with its neighbor to bring about a harmonious street system, especially if a state or county planning bureau, having a paid staff, can assist in bringing them together on a sensible layout. The probabilities are that this subject of power to plan beyond the city limits should be inserted in some city charters and not in others, and should not be part of a general law for all cities of a state. Isolated cities can well be given this power.

Regional Park Systems

While for general city and regional planning state legislatures should favor advisory commissions with staffs, and give due regard to home rule, the creation and control of regional park systems by commissions with power is turning out to be the right method. Municipalities like it; and although it involves a surrender of home rule, they are often willing to contribute to the cost. The municipalities around Los Angeles willingly combine to support a flood control commission with power, because the municipality nearest the mountains must pass on the flood water to its neighbor further down the slope, and it in turn to the neighboring municipality near the sea. The reason why they all surrender home rule in this respect is because the flood water would otherwise be without control. The sum and substance of the whole matter is that each municipality insists on handling its own streets, small parks and zoning. At least it wants the power of control. It is usually willing to take and follow good advice from the outside. But matters like regional parks, regional sewers and regional flood control, it willingly surrenders to a commission with power, because that is the only way to get results.

Assessments for Public Improvements

No state can expect its municipalities to carry out efficient city planning unless it gives them adequate power to levy assessments on areas benefited by public improvements. The cost of street openings, pavements and sidewalks, park openings and sewers it should be possible to assess in whole or in part. Greater New York has developed a remarkably flexible procedure in such assessments: the cost of an improvement can be assessed in whole or in part on an area of assessment; different zones can be established for this purpose; part of the cost can be thrown on any one of the five boroughs, or part on the city at large; assessments can be converted on application of the landowner into ten annual instalments, one of the instalments becoming a lien on the land each year.

Control of Real Estate Subdivisions

Probably the most fertile cause of irrational street layouts is the freedom with which private developers can create additions without regard to a harmonious official plan. Narrow streets are produced where they should be broad, and vice versa. Awkward jogs and culs-de-sac are created. Direct main thoroughfares are made almost impossible when needed. Buildings are erected in the wrong places. The expense of replanning prevents doing the planning over again. Some state legislatures have prohibited the filing of plats in official recording offices until they are approved by the municipality. This is a move in the right direction. It is not a complete remedy, however, for developers can still sell off their building lots by metes and bounds, and refrain from filing plats. Accordingly, some states have tried to prevent sales except by

reference to filed plats. This has not worked very well, because these laws have usually tried to compel the dedication of the streets by the developer. Compulsory dedication is an indirect way of taking private property for a public use without compensation and is probably unconstitutional. Every such law should provide that the developer need not dedicate the streets and that he can make a notation to that effect on the plat. In one way or another the streets will eventually become public.

Preventing Buildings in Mapped Streets

The problem of how to prevent buildings in mapped streets before they are opened is just about as serious. To-day, except in Pennsylvania, an owner of land within the bed of an officially mapped street can erect a building in it if the street is not yet legally opened and then insist on full damages when the opening takes place. It is easy to say that every official street should be immediately opened. But a moment's consideration will convince one that sound planning for the future requires determination of street and park locations before the approach of actual building. Farms cannot be cut up prematurely, yet the future street plan should be determined twenty-five or fifty years before actual improvement. When determined, it should be stabilized. City officials can hardly be expected to lay out future streets with great care and forethought if landowners can freely erect structures in the beds of mapped streets, thus compelling constant changes of the plan.

Is there a lawful method of preventing structures in mapped streets before the streets are legally opened? The proposed new charter of Greater New York prepared by the recent Charter Commission contains a method of accomplishing this that is undoubtedly lawful. The building commissioner cannot grant a permit to build in the bed of an unopened street. The applicant may, however, apply to the board of appeals, which has power to grant a permit with conditions that will limit the proposed structure to a comparatively inexpensive sort and yet assure a fair return on the investment. It is regulation, not appropriation. This plan is based on the principle that the official city plan is established under, and protected by, the police power, that is, for the health, safety and general welfare of the community. The new charter for Nassau County, New York, contains substantially this provision. This plan has been approved by the present administration of Greater New York, and a bill to enact it was placed before the last session of the state legislature by the corporation counsel, but failed to pass. Planning commissions of Massachusetts are advocating another method to accomplish the same result. Legislation is sought empowering municipalities to condemn an easement in favor of the public over the bed of unopened streets, preventing structures pending opening. This follows the analogy of a Massachusetts law now meeting with success which allows the establishment of setback building lines under eminent domain. The municipality simply appropriates the easement constituting the setback, leaving the owners to present claims within a fixed time. The owners seldom or never do this, because their benefit is usually as great as their damage. Thus the municipality virtually obtains the setback by default of owners.

The New York method has the advantage of automatic application to every mapped and unopened street, whereas official action must take place regarding each street under the Massachusetts plan. The New York method is under the police power; the Massachusetts method is under eminent domain. Both plans would allow temporary structures. The Massachusetts plan is not adapted to the legislative methods of New York and other states where owners in condemnations by municipalities are made parties to an action and if the parties do not appear awards are made to unknown owners. In the latter situation some owners will always make formal claims for damages, and this virtually compels others to do the same whether they want to or not.

Providing Areas for Playgrounds

Playground legislation will yearly come more insistently to the front. Street danger from automobiles is largely responsible for this. Legislative methods of compelling the automatic setting aside of small parks by developers, the same as they are now compelled to set aside streets, will be perfected. This requirement should be brought under the police power; that is, it should be fairly based on the health and safety of the community. The automatic method should apply only to areas entirely undeveloped for community habitation, and care should be taken that the statute does not compel dedication. In built-up areas and areas with an opened street system, it would doubtless be unreasonable to require the gratuitous setting aside of small parks. In such areas municipalities must provide playgrounds (small parks) by purchase with public funds, or by assessing the cost on the benefited district.

Selecting Our Fire Fighters

High Mental Standards More Important Than Exceptional Physical Endowments

THE possibility of improving the methods of selecting fire fighters is interestingly discussed in an article by F. A. Moss and Fred Telford in the October number of *Public Personnel Studies,* published in Washington, D. C., by the Bureau of Public Personnel Information. The authors of the article express the opinion that civil service commissions in the past have been quite successful, through the examinations they give, in getting a good type of men for this work; but at the same time, they point out, the tests in use can be materially improved. They present in detail the modified tests which they recommend.

Too much emphasis, according to Mr. Moss and Mr. Telford, has heretofore been placed on physical attainments and too little on mentality in selecting fire fighters. They point out that the age and weight limits at present bar out many men slightly below the average weight for their height; but that these barred men, in many instances, are better able to perform the duties of a fire fighter than many of the larger men accepted. Especially does it seem to the authors a dangerous policy to insist that the men who enter the fire department at the ages of 20 to 30 be above the normal weight for their height at that time, as these same men, if they remain in the service (as most of them do), will by the age of 35 or 40 take on so much flesh that it will be difficult for them to climb a ladder carrying a heavy hose and to perform the other heavy work required of fire fighters.

Even worse, according to Mr. Moss and Mr. Telford, is the common practice of adopting such high physical standards and putting so much emphasis on mere size and strength that the civil service commissions have been forced to lower their mental standards to such an extent that their tests let through men with mentality little above the moron level, provided they are exceptionally endowed physically. In shifting the emphasis from the physical to the mental basis they would not eliminate the physical tests but would give them a comparatively low weight and would also fix the minimum standards so as to make it possible for individuals somewhat below the average height and weight to pass the tests. The main thing from the physical standpoint, they assert, is to secure men in physically good condition with sufficient strength and agility satisfactorily to perform their duties and to protect their own and their fellows' lives.

Two Classes of Mental Tests

The mental tests proposed fall into two classes: first, a general intelligence test of the army alpha type; and second, specialized intelligence tests very largely in terms of the duties which the men will be called upon to perform as fire fighters. The following is a list of the tests suggested:

Nature of Tests	Suggested Time (Minutes)	Suggested Weight
Test 1.—One of the five alternative forms of the army alpha intelligence tests ..... (A minimum required score of 55 on the army alpha scale is suggested.)	60	2
Test 2.—Accuracy of observation..... (20 questions based on a photograph of a fire scene, to be answered from memory.)	15	1
Test 3.—Understanding of printed material relating to a fire fighter's work ..... (20 questions based on the content of printed or typewritten material placed in the hands of competitors when the test is given and dealing with some phase of fire fighting or with the rules and regulations of the department.)	20	1
Test 4.—Information and judgment..... (20 questions in the so-called multiple choice form, with 4 answers from which to choose, each question dealing with some item of information which a fire fighter ought to have or with some matter of judgment.)	15	1
Test 5.—Memory for verbal orders..... (10 questions on one or more verbal orders, such as may be given to a fire fighter by his superior, to be answered from memory.)	10	1
Test 6.—Education and experience.....	10	1
Test 7.—Medical tests of physical condition and physical tests of strength and agility.....	..	3

The limitations of space make it impossible to reproduce the proposed tests in full, but that on accuracy of observation, just as it is recommended, is as follows:

Test 2—Accuracy of Observation

Directions to the examiner: Pass out the sheets containing the picture of the fire in the corner building, placing a sheet face down on the desk in front of each competitor. Secure the attention of the competitors and make some such announcement as this: "The sheet face down on the desk before you contains a picture of a large fire. When I give the signal you are to turn over this sheet and study all you see in the picture for five minutes. Later the picture will be taken up and you will be asked to answer 20 questions about it. These 20 questions will be about such things as

the time and place of the fire, how it occurred, what damage was done, and other facts such as a fire fighter ought to note. If you wish to, you may make notes about the things you see in the drawing and use these notes in answering the questions which will be asked you later. Remember that you are to have just five minutes to study the picture and that you will have to answer 20 questions about it from memory or from your notes. Are you ready?" When all are ready, have them turn over the sheets containing the picture and allow them to study it for five minutes. Then collect the pictures. Distribute the question sheets, giving one to each competitor, and allow

PICTURE USED FOR TEST OF ACCURACY OF OBSERVATION

10 minutes for answering the questions. Then collect the answer sheets:

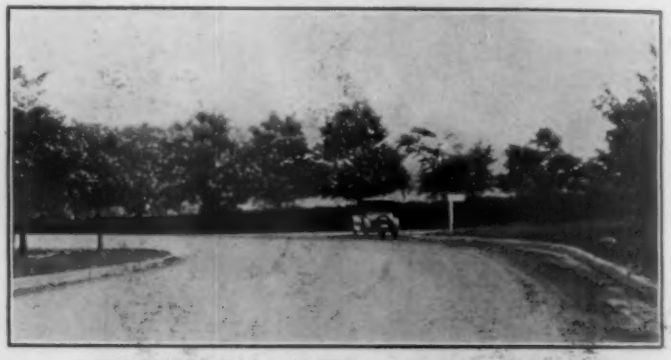
1. At what street intersection did the fire occur? .....
2. How many stories are there in the building in which the fire occurred? .....
3. How many fire escapes can be seen on this building? .....
4. What, if anything, is there to indicate that the fire started in the corner store? .....
5. What business concern occupies the corner store? .....
6. What is the name of the hotel? .....
7. When was the hotel built? .....
8. As indicated by its sign, what kind of hotel is it? .....
9. How many fire vehicles can be seen? .....
10. What is there to indicate that several more fire vehicles have responded to the call than can be seen in the picture? .....
11. What was the highest story to which fire ladders were placed? .....
12. What are the men in the window of the upper story preparing to do? .....
13. What, if any, provision to take care of the injured can be seen? .....
14. What is there to indicate that danger in the building from live electric wires has been eliminated? .....
15. Did the fire occur in the daytime or at night? .....
16. At approximately what hour was the picture taken? .....
17. About what date did the fire occur? .....
18. What indicates that part of the first floor of the building was not occupied at the time the fire occurred? .....
19. How far would you estimate it is from the building to the nearest fire alarm box? .....
20. Name two special fire hazards run by a building occupied by such businesses as those represented in the picture.
    (a) .....
    (b) .....

Oiled Earth Roads on Long Island

By A. T. Goldbeck

Chief of Division of Tests, U. S. Bureau of Public Roads

ONE of the very objectionable features of an untreated sand-clay or top-soil road is the dust created by traffic when the road surface is dry. Another objection is the expense of constant dragging to keep the surface in a smooth condition. Under some conditions the rate of wear of such roads amounts to as much as an inch a year, and additional material must be placed on the surface to replace that worn away. On Long Island these objectionable features seem to have been overcome by the use of oil applied to the surface in a particular manner.



A TYPICAL OILED EARTH ROAD ON LONG ISLAND

The writer inspected a number of these roads on the southern part of the island, extending from Bay Shore to East Hampton. The soil in general is of a sandy nature, and the roads which have been treated are quite typical of sand-clay and top-soil construction. It was stated that the best results are obtained when the material is of such a nature that it is well bonded together. It must be capable of supporting heavy truck loads under ordinary weather conditions without appreciable indentation under the wheels. If the soil is practically pure sand, it will be necessary first to bond the surface with a clay or loam admixture, and, similarly, if the soil is clay, it should be treated by the addition of an admixture of sand. In the first table analyses of soil samples taken from untreated roads compared with typical sand-clay mixtures will give an idea of the nature of the surfaces treated:

ANALYSES OF SAMPLES TAKEN FROM ROAD SURFACE BEFORE OILING, COMPARED WITH TYPICAL SAND-CLAY MIXTURES

	Sample No. 1	Sample No. 2	Characteristics of Typical Sand-Clay Surfaces: Class A Hard	Class B Medium	Class C Soft
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Retained on 20-mesh	3.1	3.4			
Passing 20, retained on 60-mesh	38.2	53.9			
Passing 60, retained on 100-mesh	6.3	3.5	45-60	30-45	20-30
Passing 100, retained on 200-mesh	3.7	3.5			
Total sand	51.3	69.3	65-80	60-70	55-80
Silt	30.5	20.1	0-15	10-20	10-20
Clay	18.2	10.6	9-18	15-25	10-25
Total	100.0	100.0	....	....	....
Total sand (retained on 60-mesh)	41.3	57.3	....	....	....
Coarse material (over 10-mesh)	2.8	0.5	....	....	....

It will be noted that sample No. 1 is not of as high quality as desired even for a class C sand-clay road, while sample No. 2 should make a first class sand-clay surfacing. These analyses will serve to show the characteristics of typical roads which have been oil-treated on Long Island, and will be useful for comparison with sand-clay or top-soil roads in other localities where oiling is contemplated.

Method of Treatment

The road surface is first graded to a low crown with a road machine. The oil is then applied cold with a pressure distributor at the rate of ⅓- to 4/10-gallon per square yard. It is then covered uniformly with sand broadcast with shovels from piles along the side of the road. Only half of the road is treated at one time, and this is immediately covered. As soon as the covering is completed, traffic is allowed on the surface, and treatment is then given to the other side of the road. Within about two weeks the traffic irons down the surface and gives it the appearance of sheet asphalt. Dragging is sometimes resorted to several days after oiling, to aid in obtaining a smooth surface.

During the first year the common practice is to apply two treatments of oil. The following year sometimes one treatment is given and sometimes no treatment is necessary. Whenever the condition of the surface becomes uneven, blading is resorted to and the surface is brought back into shape. Every four or five years it becomes necessary to completely scarify and harrow the surface in order to bring it into first-class condition. Scarifying is done to a depth of 6 or 8 inches and the underlying soil is mixed to a considerable extent with the treated surface. The scarifying is not difficult, since even at the end of five years the oiled surface remains in a somewhat plastic condition. After scarifying and harrowing, a road machine is used for shaping the surface, and traffic is allowed to consolidate it. A fresh treatment of oil and cover material is then given in the manner followed on a new road.

BROADCASTING THE SAND COVERING IMMEDIATELY AFTER APPLYING THE OIL

APPEARANCE OF SURFACE A FEW DAYS AFTER TREATMENT
Traffic soon irons out the unevenness

The oil used on the roads inspected has the following characteristics:

Specific gravity, 25° C./25° C.	0.9587
Flash point (° C.)	58
Specific viscosity, Engler (25° C.)	109
Loss, 163° C., five hours (per cent)	24.39
Characteristics of residue, viscous liquid, slow flow	
Consistency of residue float test, 50° C. (seconds)	72
Total bitumen (soluble in carbon disulphide) per cent)	99.9
Organic matter insoluble (per cent)	.0
Inorganic matter insoluble (per cent)	.1
Per cent of total bitumen insoluble in 86° B. naptha	13.5

Nature of the Road Surface

When viewed from a moving automobile, the surface looks not unlike sheet asphalt, or in some cases like bitulithic when the original material contains large particles. The roadway is very readily cut with a knife, and the samples thus obtained seem very much softer than sheet asphalt. A heavy touring car creates slight cuts in it, and the tire markings are readily imprinted in the surface when the car moves slowly. In spite of the plastic nature of the surface, however, it does not seem to wave or shove and the shallow grooves

formed by vehicles do not become deep, probably because of ironing out by traffic. The low crown on these roads is advantageous, as it undoubtedly encourages traffic to use the entire width of the roadway. Surfaces six years old have retained their plastic condition and it is probable that they can be maintained indefinitely with retreatments at proper intervals. Such surfaces might have an oiled depth, owing to the building-up process of scarifying and retreatment of 3 to 6 inches, although the average depth probably was not over 1½ or 2 inches on many of the roads inspected. The depth of treatment naturally depends on the length of time the roads have been under treatment.

Some of the roads carry a very heavy touring traffic. It is stated that in some cases the number of vehicles runs up to about 5,000 and 6,000 per day during the summer season. Several heavy trucks were also noted on sections of these roads.

It seems that this treatment offers an ideal solution of the dust problem on sand-clay and top-soil roads. Macadam, gravel, and shell roads have likewise been treated successfully by this method. The cost of maintenance is only slightly more than the average cost of maintenance of the ordinary earth road in Iowa and is less than the cost of maintaining gravel roads. The riding surface presented is superior to that of either of these types and is entirely free from dust. Wherever sand-clay or top-soil roads are used, oil treatments made in the manner described undoubtedly merit a thorough trial to determine whether or not they are advantageous under local conditions. It is stated that between 1,300 and 1,500 miles of roads on Long Island have now been oiled.

ANALYSIS OF SAMPLES OF LONG ISLAND OIL-TREATED SURFACE

	Sample No. 3 Per Cent	Sample No. 4 Per Cent
Bitumen extracted	8.3	7.2
Passing ¼-inch screen, retained on 10-mesh sieve	10.5	9.0
Passing 10-mesh sieve, retained on 20-mesh sieve	9.0	9.0
Passing 20-mesh sieve, retained on 30-mesh sieve	17.0	19.5
Passing 30-mesh sieve, retained on 40-mesh sieve	14.9	15.5
Passing 40-mesh sieve, retained on 50-mesh sieve	17.1	13.5
Passing 50-mesh sieve retained on 80-mesh sieve	11.5	9.5
Passing 80-mesh sieve, retained on 100-mesh sieve	8.0	12.5
Passing 100-mesh sieve, retained on 200-mesh sieve	3.5	3.5
Passing 200-mesh sieve	5.2	10.8

NOTE.—Sample No. 3.—Bayport, L. I., road 3 years old, three applications amounting to 1 gallon per square yard.

Sample No. 4.—Sample taken from road surface just after scarifying and before retreating.

ACKNOWLEDGMENT.—Text and illustrations by courtesy of *Public Roads*, U. S. Bureau of Public Roads, Department of Agriculture.

The Far Western Child Health Demonstration

MARION COUNTY, ORE., of which Salem is the county-seat, has been selected as the field of the Far Western Demonstration, the fourth in the Commonwealth Fund Child Health Demonstration Program. The selection was made by the Child Health Demonstration Committee, only after careful weighing of applications from more than 30 cities and counties in the 11 Pacific Coast and Rocky Mountain states which had made application to the Committee. Study of these applications and of the whole western health situation began in March, and has continued to the present time, the Committee considering not only the degree of need of child health work in the different local communities, but also the conditions and resources of each applicant community as a demonstration and educational center which should influence a wider territory.

The selection of Marion County assures the interest and cooperation of the state and county health and education leaders. Its population, estimated at 55,000 in 1924, is 90 per cent American-born. It is essentially rural, Salem, the state capital, having a population of 25,000. The county's varied crops—berries, nuts, hops, flax—and its developing dairying and canning interests, indicate a greater variety and stability of resources than in a one-crop or one-industry community.

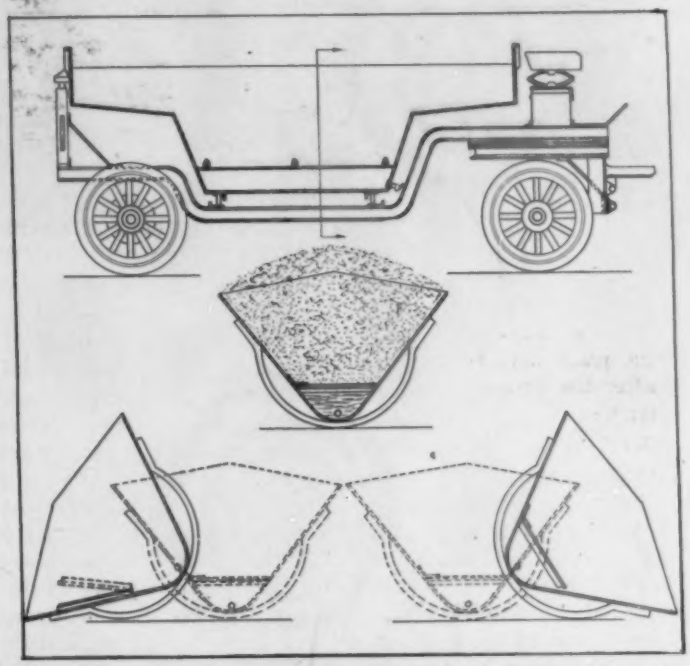
The Salem School Board has offered the Demonstration staff a conveniently located and completely equipped house for the Demonstration headquarters. Maintenance and up-keep are assured by the civic clubs of the city. The citizens of the county have pledged early establishment of a full-time county health unit, and their purpose is to increase the county's appropriations for child health each year, until, at the end of five years, they have taken over the responsibility, financial and administrative, for the complete program.

The entire program is under the Child Health Demonstration Committee, representing jointly the American Child Health Association and the Commonwealth Fund. The Committee's objective is the development of a sound community health program, beginning with the protection and promotion of child health, which the average community can carry on permanently. Such a program provides for health service beginning with the prenatal period and extending to adult life, and for all general health measures affecting directly or indirectly the health of the community's children. It aims not only to free the babies and children of to-day as far as possible from physical and mental handicaps, but to promote wholesome and constructive attitudes toward an efficient, far-visioned public health program and toward its intelligent support. In Marion County, it is the purpose to make this program give special consideration to western needs and conditions.

Dewatering Garbage During Collection and at Disposal Plant

A Better Garbage for Reduction and Incineration Produced by Dewatering

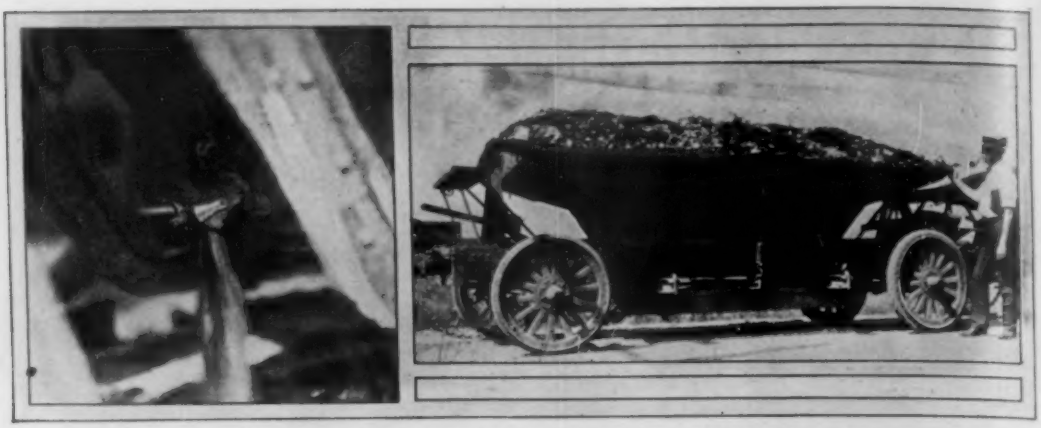
DURING 1923 the process of garbage reduction in Indianapolis underwent numerous important changes that have materially benefited operations. In cooperation with the collection department, a method was developed for dewatering the garbage in the trailers during collection. McCullough-Nolen dewatering devices have been installed in all the trailers used for the collection of garbage. During the heavy water season when a collector has filled his trailer about one-third full, he draws up over a convenient sewer manhole and drains the free water from the trailer. The same process is repeated when the trailer is about two-thirds full. The trailer is again drained when it has received its entire load and is ready for connecting in trains to be hauled to the plant. The dewatering device may be easily removed when not used in the cold winter months and when the vehicle is diverted to other uses.



DROP-FRAME TRAILER WITH PERFORATED PARTITION TO DRAIN GARBAGE

The dewatering device consists of a perforated load-sustaining plate placed in the trailer. The design of the device permits clean dumping of all of the solids in the vehicle as well as thorough cleansing of even the water-receiving compartment by washing after dumping. The garbage is dumped into the trailer from the individual household containers, and as the trailer bumps along over its route, the free water contained in the garbage is drained from the solids and settles into the water-receiving compartment in the bottom of the trailer. It will be noted that the shaking is done after each small lot of garbage is dumped into the trailer, thereby giving the garbage every opportunity to rid itself of its free water content at once.

Instances have been noted where more than 150 gallons of water have been drained from a single trailer from the time the collection starts until the garbage is ready for dumping into the pit at the reduction plant. The principal advantages of dewatering are: (1) the garbage is in better condition for cooking at the plant; (2) it eliminates a large part of the odors about the plant; (3) better garbage produces better products; (4) better products bring greater financial returns; (5) it eliminates some of the hazards of garbage reduction; (6) it increases the capacity of the plant by eliminating raw material that gives little or no return in product; (7) it separates the free water from garbage during collection; (8) it lowers collection costs; (9) it lowers reduction costs; (10) it lowers incineration costs because dryer products are fed to the fires for burning; (11) it reduces the hazards of feeding raw garbage; (12) it decreases the collection and disposal plant labor turnover; (13) it permits hauling bigger loads in some cases over 50 per cent bigger; (14) it protects the public health by eliminating odor and fly nuisances due to spilling garbage liquor on the streets; (15) it reduces criticism



DROP-FRAME TRAILER EQUIPPED WITH DRAINAGE DEVICE
Liquid being drained from wagon over sewer manhole

against the collection system; (16) it simplifies the collection system.

An arrangement whereby the garbage pit at the plant may be drained was installed soon after the dewatering devices were put in the trailers. The results obtained from installing the facilities for dewatering green garbage have been remarkable from an operating standpoint. The green garbage after being dewatered remains fresh and in good condition for cooking, for a much longer time than when not dewatered. The difficulty of handling it is less and the cooking results superior. It has been found that the water drained from the green garbage does not carry a sufficient quantity of solid matter to warrant the expense of collecting and treating it. With the free water eliminated, it has been found that the tankage yield from the digestors is greater per charge. The cooking results are better, the tankage of a better quality, and the difficulties of processing are greatly reduced. The success of drying and grease-recovery operations are dependent upon the cooking results obtained in the digestors. Since the dewatering campaign was inaugurated, the recovery of grease has been greater and less expensive. There are also certain operating hazards in processing garbage. Among these is the foaming of the digestors during the cooking period. Dewatering has practically eliminated foaming, with its attendant high tank pressure that often exceeded the live steam pressure in the boilers. It has also gone far toward eliminating the odors of the garbage pits and plant.

For several years it has been usual to operate a night shift at the reduction plant during the summer. During the last year the night shift has been eliminated, principally on account of the development of the dewatering devices.

The results of the improvements that have been made are shown by the fact that although 1,059 tons less green garbage was received at the plant during the last complete fiscal year, the total grease production was increased 55,200 pounds.

Cincinnati Adopts P. R. Manager Government

FOLLOWING the lead of Cleveland, Cincinnati voted on November 4 by more than two to one to abolish its mayor and ward council plan of government and to adopt the city manager plan with proportional representation.

Some months ago Dr. Lent D. Upson, of the Detroit Bureau of Municipal Research, was engaged to conduct a thorough survey of the city government of Cincinnati and recommend any changes needed. After a very thorough investigation with a staff of trained assistants, Dr. Upson recommended non-partisan elections, a smaller council, and provision for the representation of minorities. Professor Thomas H. Reed of the University of Michigan, special investigator of the city council, reported: "Since the lack of an active opposition, more than anything else, has tended to degenerate the government of Cincinnati, we felt called upon to urge the use of some method of choice which will give us the advantage of election at large, together with a reasonable representation of minorities. This can be done most fairly by proportional representation. Under this system each group of opinion which can muster one-ninth of the total vote may be represented in a council of nine."

The amendment which has just been passed puts into effect the most important recommendations of the experts who made the survey. It reduces the council from 32 members to 9, provides for its election from the city at large on a non-partisan ballot by proportional representation, and gives the representative council complete control over the city government by allowing it to employ, supervise, and, if necessary, replace the city's chief executive. The first proportional election will be held next fall at the time of Cleveland's second election under the same method.

Does Street Flushing Fill Up Catch-Basins?

A Discussion of Experiments Made in Philadelphia in August, 1924

By A. M. Soby and J. H. Nuttall

Deputy Chief and Assistant Engineer, respectively, Division of Street Cleaning, Philadelphia

CLEANING by motor-driven flushers has in recent years been increasingly regarded as the most economical and efficient method of cleaning streets. The principal factor that has served to render the flusher most desirable has been the increased yardage of modern smooth-surface streets in our cities, and it is on these streets that the flusher is principally used.

Ideal cleaning can best be obtained by the use of high-pressure hose followed by laborers with hand brooms and hand squeegees, but this type of cleaning is extremely expensive and wasteful of water. The rotary squeegee machine performs excellent cleaning with a minimum of water on streets of a perfectly smooth surface, but it is expensive to operate and inefficient on streets with even slight depressions. The flusher combines most of the advantages of both these types of cleaning and is open to few of the disadvantages.

FLUSHER USED IN TESTS, SHOWING PRESSURE GAGE ON SINGLE NOZZLE USED

There has been considerable objection, however, to the use of the flusher, because of the alleged washing of dirt into the catch-basins or inlets and thence into the sewer. Where trapped inlets are in use, as is the case in practically all of our cities, it is scarcely possible for material in large quantities to enter the sewer from the inlets excepting in the case of a heavy storm, and in this event any material washed into the sewer is usually carried to the outlet by reason of the heavy flow. During normal rainfall, such material as enters the sewer is sufficiently small in size to be held in suspension and is consequently carried to the sewer outlet with the normal dry-weather flow of the sewer, particularly where the combined system is in use.

The case of dirt being deposited by cleaning methods in the inlet and collected from the catch-basin is another matter, as the problem then arises as to whether it is cheaper and more desirable to collect the dirt from the catch-basin or to sweep and collect it from the gutter. As there appear to be no reliable data on the amount of material flushed into inlets, tests were made by this Division in order to secure definite information on the subject.

Plans for Tests

A test of this character should necessarily stimulate normal conditions, but with determinable quantities and sizes of material for comparison purposes. It should also be made on streets with ideal surfaces and with known longitudinal and cross-grades. As the amount of dirt collected from streets of this character during ordinary cleaning operations is of so small an amount per square yard as to be impossible of determination, excepting by laboratory methods, it is necessary to use a quantity much greater than would normally be found on the streets, and the material used should be uniform for all tests and of known size and weight.

To meet these conditions, it was decided to utilize streets within an area of three by two blocks in the northern West Philadelphia section. The streets used had all been recently

paved with sheet asphalt, and were in excellent condition, with 22½-inch vitrified block gutters, with uniform cross-grades of 5/16-inch per foot, and with longitudinal grades of 1, 2, 3, 4 and 5 per cent respectively.

The material used as a substitute for natural conditions, other than those behind the ash routes, was of two kinds: one being a paving gravel, the other a sandy loam, mechanical analyses of which are as follows:

Passing Screen	Paving Gravel	Sandy Loam
100	1.4	14.3
50	11.3	11.5
30	43.0	23.0
16	21.8	23.2
8	14.7	19.3
4	5.8	4.6
Returned on 4	2.0	4.1
	100.0	100.0
Weight cubic feet	93.9 lbs.	90.7 lbs

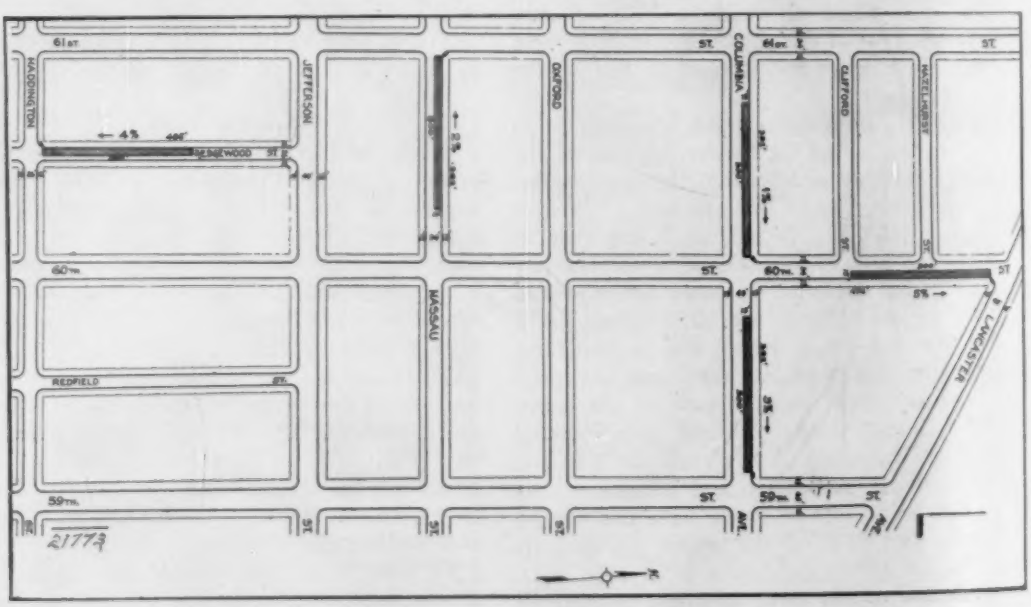
In addition to the foregoing, a test was made with cans and newspapers, to correspond to conditions found by the cleaning gangs following the ash and rubbish collection.

In tests using gravel and loam, the material was scattered by hand upon an area 15 feet wide x 300 feet long, containing 500 square yards, to a uniform weight of ½-pound per square yard on each street, after the pavement had been thoroughly flushed and the gutters swept. This area was divided into sections of 25 feet each, numbered 1 to 12 from the inlet. A screen fabricated from ½-inch round steel, 8 inches high x 7 feet long and bent at 45° 3 feet from end, covered with burlap, was placed at the inlet in order to prevent the entrance of material, which was considered a more practical method than cleaning out the catch-basin and removing the dirt afterwards from the inlet, as it would in this case have been necessary to bale out the water before the material within could have been removed.

Flushing Equipment

The Division possesses 26 flushers, 3 of which are Packards, single-unit, transmission pump drive of 1,750-gallon capacity; 15 are single-unit, front-drive Packards, 1,500-gallon capacity; 6 are single-unit, front pump drive Macks, 1,500-gallon capacity; and 2 are double-unit, 1,500-gallon capacity Macks. It was considered advisable in all tests to use a flusher as near the average as possible, rather than the best or the worst, and to this end Packard Number 21, a single-unit, front pump drive flusher was adopted. No change was made in the flusher excepting that it was equipped with a pressure gage on the nozzle as well as on the dash. A mechanic who had formerly had considerable experience in driving a flusher was used as chauffeur on all tests. The nozzle was set with opening as follows: 7⅛ inches at front and 7⅜ inches at back above street, the front end of opening being 4½ inches behind back end, and the length of opening 7⅛ inches.

In conducting the tests the flusher was operated with the nozzle on a line 15 feet distant from the curb, and the speed was kept as



MAP OF STREETS UTILIZED IN PHILADELPHIA FLUSHER EXPERIMENT

TABLE "A"

Test	Sq. Yds.	Grade %	Grade +Up —Down	Material	Lbs.	Flushing Time in Seconds	Speed M.P.H.	Gals. Water	Pressure Lbs.	Gear	Time Water Run-off	Time Mat. Dried	Weight of Material (Lbs At Inlet	In Gutter	Total
1A	500	1	—	Paving Gravel	250	90	2.3	198	45	1	20 min.	1½ hr.	11	239	250
1B	500	1	+	Paving Gravel	250	88	2.3	195	45	1	16 "	1½ "	10	240	250
1C	500	1	—	Loam	250	82	2.5	185	45	1	18 "	1½ "	60	190	250
2A	500	2	—	Paving Gravel	250	82	2.5	185	45	1	14 "	2 "	15	235	250
2B	500	2	+	Paving Gravel	250	80	2.8	196	40	1	14 "	1½ "	15	235	250
2C	500	2	—	Loam	250	82	2.5	185	45	1	16 "	1½ "	90	160	250
3A	500	3	—	Paving Gravel	250	79	2.7	165	45	1 & 2	16 "	2 "	17	233	250
3B	500	3	+	Paving Gravel	250	80	2.3	195	45	1	12 "	2 "	52	198	250
3C	500	3	—	Loam	250	83	2.5	185	45	1	13 "	1½ "	112	138	250
4A	500	4	—	Paving Gravel	250	79	2.6	175	45	1	13 "	1½ "	35	215	250
4B	500	4	+	Paving Gravel	250	90	2.3	198	40	1	19 "	1½ "	64	186	250
4C	500	4	—	Loam	250	79	2.6	175	45	1	19 "	1 "	123	127	250
5A	500	5	—	Gravel	250	84	2.4	185	45	1	10 "	2½ "	54	196	250
5B	500	5	+	Gravel	250	88	2.3	198	45	1	16 "	1 "	91	159	250
5C	500	5	—	Loam	250	85	2.4	187	45	1	12 "	1 "	130	120	250

NOTE—Tests 1A B & C were made on Columbia Ave. between 60th & 61st Sts. Tests 2A B & C were made on Nassau St. between 60th & 61st Sts. Tests 3A B & C were made on Columbia Ave. between 59th & 60th Sts. Tests 4A B & C were made on Edgewood St. between Jefferson & Haddington. Tests 5A B & C were made on 60th St. between Columbia & Lancaster.

TABLE "B"—FLUSHER TEST DATA TABULATION SHOWING WEIGHTS OF MATERIAL

Test	Material	Lbs. Placed	At Inlet	Sec. 1	2	3	4	5	6	7	8	9	10	11	12	Total
1A	Paving gravel	250	11	6	19	16	18	23	25	15	18	26	26	25	22	250
1B	Paving gravel	250	10	17	17	17	16	12	12	12	20	28	35	24	30	250
1C	Loam	250	*60	28	20	22	15	16	16	14	15	16	10	10	8	250
			*Includes 20 lbs. in suspension													
2A	Paving gravel	250	1o	4	30	23	17	30	26	21	27	24	15	11	7	250
2B	Paving gravel	250	15	5	40	12	18	28	26	21	27	25	13	12	8	250
2C	Loam	250	*90	13	15	8	8	22	16	8	16	16	14	16	8	250
			*Includes 28 lbs. in suspension													
3A	Paving gravel	250	17	5	25	24	24	24	25	21	25	10	17	12	12	250
3B	Paving gravel	250	52	10	13	20	12	30	22	8	16	18	24	15	10	250
3C	Loam	250	*112	8	10	12	19	14	14	11	13	13	9	9	6	250
			*Includes 43 lbs. in suspension													
4A	Paving gravel	250	35	15	13	15	20	14	18	22	22	20	20	22	14	250
4B	Paving gravel	250	64	10	8	24	10	10	12	32	20	16	8	28	8	250
4C	Loam	250	*123	5	6	9	8	8	15	14	14	16	9	16	7	250
			*Includes 58 lbs. in suspension													
5A	Paving gravel	250	54	11	12	13	10	14	13	13	20	20	24	36	10	250
5B	Paving gravel	250	91	29	18	30	8	5	5	6	6	5	5	22	11	250
5C	Loam	250	*130	15	10	10	10	5	10	10	15	10	10	10	5	250
			*Includes 70 lbs. in suspension													

nearly as possible to 2.5 miles per hour, being determined by the actual length of time required by the flusher to travel 300 feet, as this was considered more accurate than reading the speedometer. This was done once with the paving gravel and once with the loam, the flusher operating down hill, and once operating up hill with the gravel only, as it was not considered necessary to use the loam also in this case. The results obtained in these tests are shown in tables "A" and "B." Table "A" shows the various details of operation and Table "B" shows the distribution of material in the gutter, into which all material was washed by the flusher, none remaining outside the 22½-inch width of gutter. For convenience in visualizing these results, a graph, "C," was prepared and is reproduced on the following page.

Analysis of Tests

Upon being analyzed, the test shows that it is possible to flush a far greater amount of dirt than is normally found upon any smooth street in a residence neighborhood into the gutter from a distance of 15 feet from the flusher nozzle, and that, once in the gutter, the amount of material carried to the inlet is dependent upon the grade of the street and the volume of water in the gutter.

From table "B" it will be noted that there is little uniformity in the amount of dirt deposited on the various sections, this being due to the irregularity in the gutter more than to any other factor.

In order to simulate cleaning conditions behind the ash and rubbish route, newspapers and cans were placed alternating at a distance of 12½ feet apart, a distance of 15 feet from the curb. The flusher was then operated down hill as before, and the number of papers and cans reaching the gutter, and those which would have been deposited in the inlet, were it not for the screen, were noted, with the results shown in table "D." Considering the variation in the material used from that of the previous tests, the correspondence in results because of grades is remarkable.

TABLE "D"—SPECIAL FLUSHER TEST DATA

Test	Sq. Yds.	Material	No. Placed	Speed M. P. H.	Flusher Time	Gals. Water	Location of Material after Flushing In Inlet	In Gutter
1 1%	500	Newspapers & Cans	12 each	2.5	52 sec.	185	0	12 papers & 12 cans
2 2%	500	" " "	12 "	2.4	85 "	185	5 papers 2 cans	7 " " 10 "
3 3%	500	" " "	12 "	2.5	83 "	185	7 papers 1 can	5 " " 11 "
4 4%	500	" "	12 "	2.5	83 "	185	11 papers 4 cans	1 " " 8 "
5 5%	500		12 "	2.4	85 "	185	12 papers 4 cans	8 "

Placed 15' from curb—25' apart

Test No. 1—Columbia Ave. between 60th & 61st Sts. Test No. 2—Nassau St. between 60th & 61st Sts. Test No. 3—Columbia Ave. between 59th & 60th Sts. Test No. 4—Edgewood St. between Jefferson & Haddington. Test No. 5—60th St. between Columbia & Lancaster.

The tests show that where any considerable amount of material is present upon streets cleaned by flushing, the water will deliver an appreciable amount of material at the inlet, but as the normal amount of dirt produced in two days in this section, excepting behind the ash route, is .049 pounds per square yard, it will be seen that it is desirable to flush this small amount of material into the inlet and remove it thence rather than to sweep the gutter for such a small quantity.

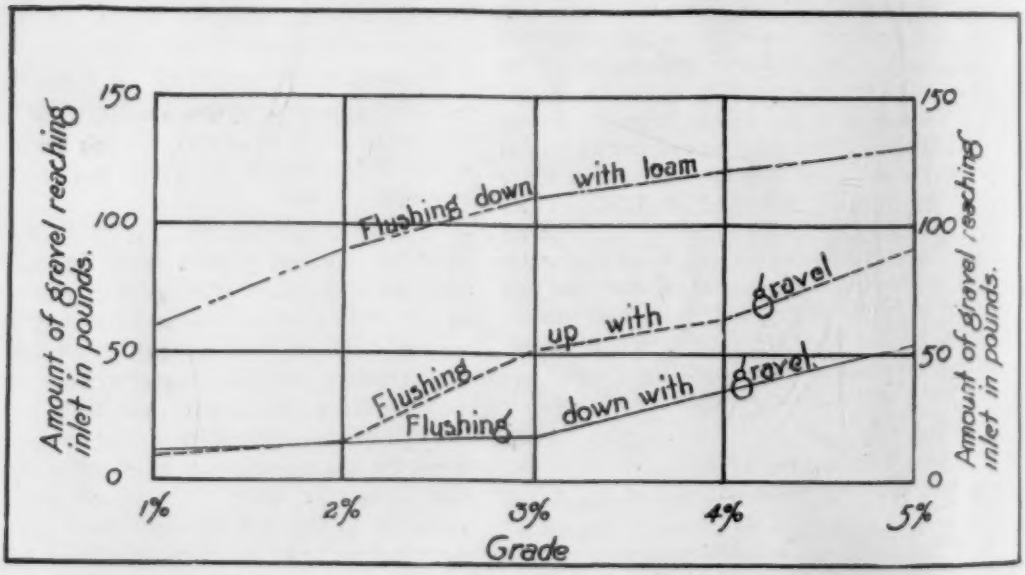
It it were possible to actually determine the amount of material upon a street prior to flushing, tests similar to the foregoing would be unnecessary, but as this is not possible, an idea of the amount of material reaching an inlet under normal conditions can be gained only by utilizing information as secured above, and correcting it to normal conditions over larger areas.

Catch-basins, or inlets, in the city of Philadelphia are all trapped, are constructed of brick, lined with flags, are of either the open-mouth or the grate-top type, as necessitated by local conditions, and are in four sizes numbered 1, 2, 3, 4, beginning with the largest. The number 4 size is rarely used, and the number 1 and number 2 sizes are used on heavy grades or at the end of a considerable length of gutter. The catch-basins are of such capacity that it would require 15.8 cubic feet, 12.4 cubic feet, and 9.0 cubic feet of dirt to entirely stop the flow of water to the sewer in the 1, 2 and 3 sizes respectively.

In accommodating the information obtained in the tests to normal conditions, the test with the paving gravel will be utilized, as much of the material contained in the loam was carried in suspension into the sewer.

Table "A" shows that the amount of material reaching the inlet is proportional to the whole amount of material in the test section as follows:

1 per cent grade	.044
2 per cent grade	.060
3 per cent grade	.068
4 per cent grade	.140
5 per cent grade	.216



GRAPH "C," SHOWING EFFECT OF GRADE ON AMOUNT OF MATERIAL FLUSHED INTO SEWER INLET

The quantity of dirt obtained by three-times-per-week cleaning per square yard was given above as .049 pounds, and this figure was obtained by actually weighing the amount of dirt removed from a section of 190,000 square yards. In a section of this character an inlet will usually be found on each side of a street at intervals of 500 feet or less, and if the average width of street is taken as 30 feet, the paving area discharging into the inlet would then be 500 x 15 feet, or 833 square yards, and the normal amount of dirt accumulating in this section in 2 days would be 40.8 pounds.

In utilizing the above percentages, it will be seen that on this basis the amount of dirt that would be flushed into the inlet on the different grades if cleaning proceeded every other day, would be as follows:

Grade	Amt. Reaching Inlet (2 Days) Pounds	Cu. Ft. (2 Days)	Days to Fill Inlet 1	2	3
1 per cent	1.79	.020	158	124	90
2 per cent	2.45	.027	116	92	66
3 per cent	2.77	.031	102	80	58
4 per cent	5.71	.063	50	40	28
5 per cent	8.81	.098	32	26	18

Estimated at 90 pounds per cubic foot.

From this it will be seen that the amount of dirt flushed into the inlet in a residential section even on heavy grades is inconsiderable.

In the discussion above, results obtained with gravel were considered, but if the loam were utilized, there would be a considerable variation, for although a greater proportion of material reaches the inlet, a considerable amount is carried in suspension, as is shown by the following tabulation:

Grade	Loam Tests Total Lbs.	Suspensions Lbs.	Per Cent Total
1 per cent	60	20	33
2 per cent	90	28	31
3 per cent	112	43	38
4 per cent	123	58	47
5 per cent	130	70	54

While it is not practical to fix a definite relation between the amount of dirt flushed from the street and that reaching the inlet except by the above method, a test was made of dirt flushed to the inlet from 10,200 square yards of paving on a street carrying somewhat heavier traffic and producing slightly more dirt than in the section above, but flushed daily, which amounted to 10.88 pounds, or .069 pounds per 833 square yards, which is almost exactly that obtained per day by utilizing data obtained in the test.

Conclusion

It is apparent that any dirt which is on our streets in sufficiently small quantities to be removable by water only, is so small in size as to be carried by any amount of water used into and through the sewer in suspension; that heavy dirt on all excepting very heavy grades remains in the gutter; and that any material reaching the inlet is readily removable. This is particularly true in Philadelphia, because of the total area of streets flushed, only a very small proportion is on grades of over 2 per cent, as is shown by the following tabulation:

Grade	Proportion of Total Area
Less than 1 per cent	44 per cent
1 to 2 per cent	38 per cent
2 to 3 per cent	11 per cent
3 to 4 per cent	4 per cent
Over 4 per cent	3 per cent

Niagara Frontier Planning Association Organized

LOOKING toward the creation of the first official regional planning body in New York State, official delegates of all municipalities of Erie and Niagara Counties, at a meeting held at Tonawanda on November 17, organized the Niagara Frontier Planning Association.

This volunteer association will promote regional planning for the future development and growth of that territory extending from the Niagara River between Lake Erie and Lackawanna westward to include the cities of Lockport, Niagara Falls, North Tonawanda, Tonawanda, Buffalo, and Lackawanna, also twenty-two villages, some lying along the river and lake region and others bordering upon a rapidly developing metropolitan area extending beyond the borders of the various cities.

Pursuant to a resolution adopted at the organization meeting, the Association will endeavor to secure the passage of legislation authorizing the creation of a Niagara Frontier Planning Committee, which will be an official body of thirteen members, composed of the mayors of the six cities of the Niagara Frontier, or persons designated by them, and six supervisors appointed by the Board of Supervisors of the counties of Niagara and Erie, these twelve to meet and select the thirteenth member, who shall act as chairman. It is proposed that this committee shall maintain a technical staff and make detailed surveys and studies of a comprehensive plan for the Niagara Frontier and that the committee shall be financed by the two counties pro rata on the basis of their equalized assessed valuations.

The organization of the Niagara Frontier Planning Association was first proposed at a meeting called by the New York State Commission of Housing and Regional Planning in Buffalo on June 10 last. The officers elected by the Board of Directors on November 17 are as follows: President, Alexander J. Porter, of Niagara Falls; First Vice-President, J. Fred Moore, of Tonawanda; Second Vice-President, Nathaniel Foster, of Lockport; Treasurer, Henry P. Smith, of North Tonawanda; Secretary, H. A. Chapin, of Tonawanda. The Association will maintain an office in Tonawanda, with a small paid staff.

Wear of Concrete Pavements Tested

Report of Accelerated Tests by United States Bureau of Public Roads

By F. H. Jackson and J. T. Pauls

Senior Assistant Testing Engineer and Highway Engineer, respectively, United States Bureau of Public Roads

THE accelerated-wear tests of concrete pavements conducted by the Bureau of Public Roads, at Arlington, Va., during the past 18 months, have reached the stage where it is possible to draw fairly definite conclusions from the data so far obtained. The sixty-two concrete test sections, each 4 feet wide by about 10 feet long, and constructed in the form of a circle approximately 625 feet in circumference, have been subjected to approximately 300,000 passages of a solid-rubber-tired truck wheel loaded to 3,000 pounds and traveling around the circle over the same path at a speed of 22 miles per hour. Careful observations of the lateral distribution of traffic across actual pavements indicate that about 10 per cent of the total passes over a 6-inch width at the point of greatest concentration. This is based on traffic passing in two directions over an 18-foot road. On this basis it is estimated that the experimental pavement sections have been subjected to a traffic equivalent to about 1,500,000 2-ton trucks operating at a speed of 22 miles per hour, assuming the distribution indicated by the above observations. In addition, the test sections have been subjected to about 50,000 passages of a rubber-tired wheel loaded with the same weight and equipped with non-skid chains, and the same number of passages of a plain rubber-tired wheel. The wheels in this part of the test traveled over a new path. It will be seen, therefore, that the equivalent of an enormous volume of traffic has been put upon the pavement—an amount probably equivalent to several years' traffic on the average concrete road.

It was, of course, impossible to reproduce on the test sections in the short space of a year and a half the effect of freezing and thawing which, through a period of years, may weaken actual roads so that they become less resistant to traffic. It was likewise impossible to reproduce the effect of differential expansion and contraction of the thin, rich mortar top and the mass of the concrete, which, caused by wide variations in temperature, may also, in time, lower the resistance of a pavement. The essential time element is lacking. In these respects, therefore, the test did not duplicate actual conditions, and for this reason the differences in the behavior of the several sections under examination may not be so marked as they normally would have been.

The primary object of the test was to determine what relations, if any, exist between the surface behavior of concrete roads under traffic and the various laboratory tests for quality of the aggregates. Incidentally it was also deemed desirable to determine the relation between the wear as produced by traffic, as well as by laboratory test, and the various physical properties of the concrete, such as crushing strength, transverse strength, modulus of elasticity, and absorption. All of these tests were made on the concrete used in each of the 62 test sections.

Specifications for aggregates for concrete pavements are usually drawn to cover the gradation and the quality of the material furnished. The gradation, or proportion of the various sizes, especially as regards aggregates which are crushed and screened, depends largely on factors which can be controlled, so that the engineer may obtain almost any desired gradation of sizes, provided he is willing to insist upon it. The quality of the material, however, cannot be fixed in so arbitrary a fashion. On account of the high cost of transportation, the aggregates for any given improvement must generally be found within a relatively short distance of the site of the work. Therefore, as the quality and character of materials vary so greatly in different parts of the country, it follows that many different kinds and types of aggregates must be employed in the construction of concrete roads. All that can be done is to draw specifications in such a way as to insure the use of the best material available for the work. In so doing, however, there is always a minimum limit beyond which it is unsafe to go.

What are the safe test limits for the various kinds of aggregates used in concrete road construction? Do the present limits for wear, strength, etc., insure the selection of safe materials, or, on the other hand, do they unduly add to the cost of construction by setting laboratory requirements too high? These are some

of the questions which the accelerated-wear tests were designed to answer.

The detailed conclusions which it has been possible to draw from the test are set forth fully at the end of this article. Outstanding from these conclusions are two facts of major importance. These are:

1. That rubber-tired traffic alone does not appreciably abrade the surface of a concrete pavement.

2. That there is no consistent relation between the results of the "tensile-strength-ratio" test for sand, the compression or transverse strength tests, or the Talbot-Jones wear tests of concrete, and the wear-resisting properties of concrete pavements.

The sections were divided for purposes of study into five major groups, as shown in table 2. The source, character, and physical characteristics of the various coarse aggregates are given in table 3, and the corresponding information for the fine aggregate in table 4. The sections in group I were constructed with the purpose of studying the effect of variations in quality of crushed stone as coarse aggregate. Ten samples of stone varying in quality from hard, tough traps to very soft limestones were used for this purpose. In group II the effect of variations in the quality of gravel as a coarse aggregate was investigated, and for this purpose nine samples of gravel from various parts of the country were obtained. Group III comprised eight sections and was for the purpose of studying the behavior of slag as concrete road aggregate. Both the size and quality of the slag as well as the effect of slag sand used as fine aggregate were studied. Four sections were constructed with blast-furnace slag, three of them using slag weighing approximately 75 pounds per cubic foot, and one using slag weighing 56 pounds per cubic foot. Copper and lead smelter slags were used in the other three sections in this group. Group IV was composed of seven sections in which the type of sand was the object of study. The sands used ranged from a very coarse, glacial sand from Wisconsin to a fine, pure quartz sand from South Carolina. Strength ratios varied from 126 to 70 per cent and the fineness moduli from 2.2 to 3.5. The sections in group V were constructed with the idea of noting the effect of various miscellaneous factors on the surface wear, such as consistency of the concrete, the time of mixing, proportions or cement content, grading of aggregates, and the effect of hydrated lime as an admixture. In addition, sections were constructed using mine chats from Joplin, Mo., and burnt clay as coarse aggregates, and limestone screenings in place of sand as fine aggregates. Finally, two sections were built without coarse aggregate, one in the proportion of 1:1½ and the other a 1:3 mortar.

Some of the Conclusions

"That gravel concrete, in general, is at least as satisfactory from the standpoint of wear as stone concrete."

"That small amounts of shale occurring in the coarse aggregate will cause both excessive and uneven wear."

"That slag or stone screenings are, in general, unsatisfactory as substitutes for natural sand as fine aggregates in concrete road construction."

"That coarse sands, other things being equal, show greater resistance to wear than fine sands."

"That unusual precautions should be taken in using mine chats or other similar harsh-working materials."

Effect of Quality of Gravel

In this group are nine sections in which various types of gravel were used. The most noticeable fact about this group is that, although a very wide range in quality of gravel is represented, in no case was the depth of wear so great as in five of the sections in group I. When tested by the Rea* abrasion test, the gravel samples ranged from 9.3 per cent to 29 per cent loss. Several of the samples consisted of pieces too small to make the abrasion test. Section 17 is a remarkable one.* Although the South Carolina quartz gravel used in this section showed a percentage of wear of 29 (which is roughly equal to about 10 in the Deval abrasion test), the depth of wear is but little above the average for all the gravel sections and is not so great as in many of the stone sections. A close examination of this gravel shows that it is made up entirely of quartz pebbles of varying hardness, on the inside, but all protected by a hard, exterior shell. A pebble when struck even a light blow will fly to bits, yet it is very difficult to scratch the surface with a knife. Apparently the quality of hardness was more important than toughness in resisting surface wear on these test sections, which leads to the conclusion that the modified Deval test for gravel may be too severe Because

* U. S. Department of Agriculture Bulletin 949, p. 8

of the presence of the large shot in the rattler, it is distinctly a test for toughness. The worst gravel from the standpoint of depth of wear is the one in section 19. This gravel contained about 5 per cent of shale particles and was submitted as an example of an aggregate of doubtful quality.

While the gravel sections appear to advantage in comparison with the stone sections from the standpoint of depth of wear, comparison as to uniformity of wear is not favorable to them. Sections 15 and 16, both containing glacial gravels, show up best in this respect. It is an interesting fact in this connection that the four sections in which limestone is a constituent material of the gravel are the poorest as regards uniformity of wear. In sections 13 and 14, the gravels contain quite an appreciable amount of soft sandstone pebbles which have been worn away by the action of the chains, leaving marked depressions in the surface. On the other hand, the mere fact that the fragments are smooth and rounded appears to make little difference as far as wear is concerned. Section 18 is a good example. Before the chain traffic was well under way, the prediction was freely made that the smooth, rounded pebbles composing this sample would speedily kick out. As a matter of fact, this is one of the best of the gravel sections, especially as regards depth of wear. Summing up, it would appear from these tests that gravel as a class should prove as satisfactory for aggregate in concrete as crushed stone, provided it is free from an excess of soft or disintegrated pebbles. Moreover, the mere fact that the particles lack toughness is no drawback provided they are sufficiently hard to resist abrasion.

Quality of Sand

In sections 20 to 26, inclusive, as well as section 50, variations in wear, due to both quality and grading of natural sand as fine aggregates, were studied. Sands were selected for this purpose varying in strength ratio from 126 per cent to 70 per cent of standard Ottawa sand and from 2.2 to 3.5 in fineness modulus. Of this group, section 22, in which a river sand from Fayette County, Pennsylvania, was used, developed the greatest depth of wear, a little over 0.4 inch. This sand contained an appreciable amount of carbonaceous shale, which probably accounts for the increased wear. It was also a rather fine sand, only 25 per cent being retained on the No. 20 sieve. The next greatest wear took place on section 50, which contained the fine Potomac River sand. Only 9 per cent of this sand was coarser than a No. 20 sieve, and the strength ratio at 28 days was only 84 per cent. Four of the test sections, Nos. 21, 14, 25, and 26, all showed about the same resistance to wear, about 0.3 inch. With the exception of No. 24, all of these may be classed as coarse sands, that is, they contain more than 30 per cent of particles coarser than No. 20 mesh. The sand in No. 24, which was from South Carolina, though considerably finer, with only 17 per cent on the 20-mesh sieve, was of exceptionally good quality, being composed entirely of pure quartz grains. A comparison of this sand with that used in section 22 is of interest because they have approximately the same grading, indicating that the variation in wear is probably due to the difference in the quality of the material. Section 20, Potomac River sand, and section 23, containing a glacial sand from Marathon County, Wisconsin, showed the smallest amount of wear. Both of these would be classed as coarse concrete sands.

The tests in general indicate the value of the coarse particles in reducing wear. For example, compare sections 20 and 50, in which Potomac River sand was used. The materials in these sections were identical except that the sand in section 50 was finer, the proportion of particles retained on the 20-mesh sieve being reduced from 40 per cent to 9 per cent. The effect on wear is quite marked.

When we come to consider the bearing which the strength-ratio test has on the pavement wear, we have difficulty in establishing any relation. The wide range in briquette strength is not reflected in the resultant wear, any more than in the concrete strength of the materials. This is probably due to the fact that the factors which influence the strength, i.e., gradation and quality of sand grains, do not affect the surface wear to the same degree. For instance, the mortar-strength test is made on a 1 to 3 mix and compared with an Ottawa sand mortar in the same proportion, whereas the cement-to-sand ratio in the test sections was 1 to 1½. The discrepancy in results, in so far as this test is concerned, is most marked in the case of section 21, in which a glacial sand from New Hampshire, containing quite an appreciable percentage of feldspar, was used. A strength test of this sand developed only 70 per cent of the strength of Ottawa sand in spite of the fact that the sand was very coarsely graded. Although this section has worn somewhat more than the Potomac River sand sections, the difference is not nearly so great as might be supposed from the results of the mortar strength test. It would seem, therefore,

that the strength-ratio test is of questionable value as an indication of the quality of sand for concrete pavement work, at least in so far as resistance to wear is concerned.

The tests in group V*b* in general indicate that variations in gradation of aggregates within the limits tried do not affect the wear to any great extent, other things being equal. It must be realized, however, that from the standpoint of uniformity in workability and consequently in strength, it is very important to have uniformly graded material in a concrete road job. A harsh-working mix due to poorly graded aggregate almost invariably results in poor concrete in the field. If an attempt is made to place the concrete at proper consistency, it is very hard to secure a satisfactory finish. If, on the other hand, sufficient water is added to make the mix workable, concrete greatly deficient in strength will result. The answer is to have the mix of such workability that it can be placed and finished without using excess water, and the authors believe that this can best be accomplished by having uniformly graded aggregates. This point is discussed here simply to emphasize a condition which is met with in practice, but which the tests did not cover, because, as has been stated, the concretes in all of these sections were of medium consistency, and not necessarily all of the same workability. These tests indicate what would probably result in practice provided the consistency were rigidly controlled irrespective of the harshness of the concrete mix.

Conclusions

Before attempting to draw general conclusions from these tests, it may be well to restate certain premises regarding the volume and character of traffic to which the test pavement has been subjected. These premises follow:

1. That on the average 18-foot concrete road, approximately 10 per cent of the total traffic moving in both directions passes over a band 6 inches in width at the point of maximum concentration. Therefore, the traffic passing over the test road should be multiplied by at least 10 to obtain the equivalent volume of traffic on an actual pavement.

2. That the comparative resistance of each test section to the surface wear produced by the tire chains is an indication of the comparative resistance which would be offered by the concrete to wear or disintegration at the edges of exposed joints and cracks under service conditions.

3. That conditions which cause surface wear, such as steel tires, tire chains tracking through snow, etc., are present to such an extent as to make it necessary to give the question of wear consideration in the selection of concrete aggregates.

The authors believe that the data so far secured warrant the following conclusions:

1. That the rate of wear of stone concrete is, in general, not affected by the coarse aggregate, provided the coarse aggregate is equal or superior to the mortar matrix in resistance to wear.

2. That excessive wear will result from the use of very soft stone as coarse aggregate even though used in conjunction with a mortar of satisfactory quality. From the results of these comparative tests, it would appear that stone with a percentage of wear over 7 should not be used in concrete road construction.

3. That gravel concrete, in general, is at least as satisfactory from the standpoint of wear as stone concrete.

4. That gravels consisting essentially of siliceous materials are superior as regards both the amount and the uniformity of wear to those containing a preponderance of calcareous fragments.

5. That gravels consisting of rounded particles are as satisfactory from the standpoint of wear as those consisting either wholly or in part of angular or crushed fragments.

6. That small amounts of shale occurring in the coarse aggregate will cause both excessive and uneven wear.

7. That the modified abrasion test for gravel in its present form is not an indication of the wear-resisting properties of coarse aggregates. It is suggested that if the severe impact action of the steel balls were decreased, much more indicative results would be secured.

8. That blast furnace slags should prove satisfactory for use in concrete pavements provided the proportion of light, porous slag is so controlled that the weight per cubic foot will be at least 70 pounds.

9. That the presence of large amounts of light, porous fragments in blast furnace slag will cause excessive wear.

10. That somewhat better results are secured by the use of the smaller sizes of slag.

11. That slag or stone screenings are, in general, unsatisfactory as substitutes for natural sand as fine aggregates in concrete road construction.

12. That the copper and lead smelter slags used in these tests would make satisfactory aggregates for concrete road construction from the standpoint of wear.

13. That coarse sands, other things being equal, show greater resistance to wear than fine sands.

14. That the so-called "tensile-strength-ratio" test is no indication of the wear-resisting properties of concrete made with these sands.

15. That the Talbot-Jones wear test is not, in general, an indication of the wear which takes place under traffic.

16. That neither the crushing nor the transverse strength of concrete is a measure of its wear-resisting properties.

17. That the addition of hydrated lime in the proportion used in these tests does not affect the wear-resisting properties of concrete.

18. That so far as resistance to wear alone is concerned, increasing the cement content beyond a cement-sand ratio of 1:2 does not materially affect the concrete. Leaner mixes, on the other hand, show considerable increase in wear.

19. That unusual precautions should be taken in using mine chats or other similar harsh-working materials, so as to increase workability to a maximum and thus make possible a smoother surface finish.

20. That, other things being equal, either an excessively dry or an excessively wet mix will show less resistance to wear than concrete of medium consistency.

Fire-Hose, Water Pressure and Hydrant Spacings

By William R. Conard
Consulting Engineer, Burlington, N. J.

THE hose generally considered as standard for fire-fighting purposes is 2½ inches in diameter, which at 90 pounds pressure at the hydrant gives a flow of approximately 195 gallons per minute through 500 feet of hose with a pressure of 20 pounds at the nozzle. Smaller hose gives friction losses too high in proportion to the usefulness of the hose, and 3-inch hose is considered too awkward to handle.

The writer believes that a water system should be so constructed as to supply an ample quantity of water for a sufficient number of hose streams to handle the ordinary fire with a water pressure of 90 pounds with the hydrants spaced not over 200 feet apart. This pressure is not a burden on the plumbing and will take care of a fire on the upper floors of an ordinary six-story building, while the firemen can work at a safe and comfortable distance from the building. This does not eliminate boosting apparatus, which is necessary when fire reaches serious proportions.

Advantages of Larger and Smaller Standard Sizes

A 3-inch hose 300 feet long will deliver 335 gallons of water at 90 pounds pressure as against 235 gallons when 2½-inch hose is used. The larger hose would be placed before the water had been turned on, and it is not likely that it would be disturbed until the "all out" signal had been given. Empty 3-inch hose is practically as easy to handle as 2½-inch hose, yet it delivers 100 gallons per minute more water.

By siamesing a 3-inch hose to two 1½-inch hose lines, either of which can be handled by one man as against two for the 2½-inch hose, it is possible to get within 15 gallons as much water and to attack a fire from two points instead of one. The added weight of hose to be carried to a fire makes very little difference since the motorization of hose-carrying equipment.

By using 3-inch hose for a portion of the line, it is possible to materially decrease the friction and increase the quantity of water delivered by the nozzle. The various combinations of 3-inch, 2½-inch and 1½-inch lines which can be quickly changed will produce different quantities of water in an advantageous manner from one or two separate lines.

It is not the intent of the writer to advocate 1½-inch hose for fires that require 3-inch pumping lines, reduced to 2½-inch size in order to handle them, but to try to present the advantages of the use of 1½-inch lines in combination with larger hose sizes.

ACKNOWLEDGMENT.—Abstract of a paper read before the New England Water Works Association, at Rochester, N. Y.

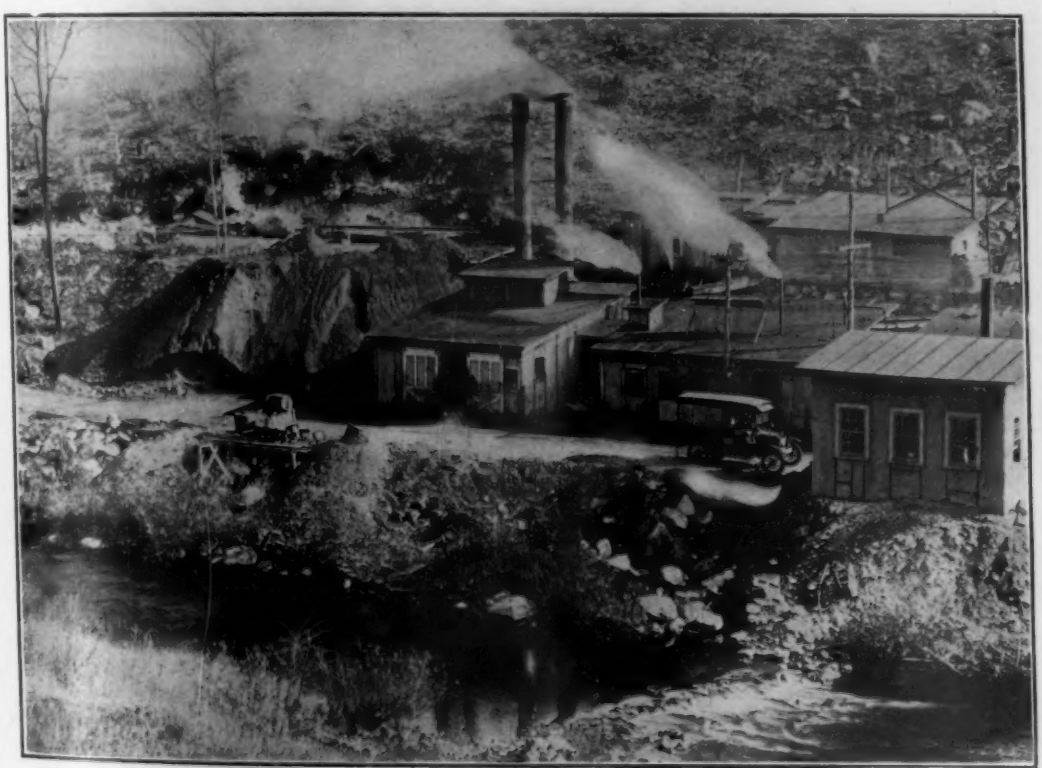
The Shepaug Tunnel Increases Waterbury's Water-Supply

Interesting Tunnel Job Handled by City Forces

By H. E. Davis

WHEN the city of Waterbury, Conn., realized that if it maintained its present rate of growth, a series of dry seasons four or five years hence would be likely to find it without sufficient water for its people, a wise decision was made to provide against that event. At present Waterbury draws excellent mountain water from the watershed of the tributaries of the Naugatuck River through several reservoirs previously constructed in this area and a pipe line from the southernmost one into the city. By building a dam across the Shepaug River, which lies to the west of the Naugatuck, and driving a tunnel through the intervening hills, a portion of the waters of this adjoining watershed, which the Shepaug naturally carries south into the Housatonic, can be diverted eastward into one of the existing reservoirs.

This project the Waterbury Board of Public Works undertook in 1919, placing its execution in the able hands of R. A. Cairns, who has served the city as Chief Engineer for many years, and has successfully carried through for it the construction of two large dams and other important work. On the basis of the efficient construction record of the city Bureau of Engineering, it was decided that, instead of employing a contractor, the Bureau should undertake the new tunnel and dam enterprise itself, and I. F. Story, who has worked with Mr. Cairns since 1908, was appointed resident engineer in charge of the work. Surveys were made and borings taken, as a result of which the line of the tunnel was run from a point on the Shepaug River about three miles north of its junction with the Bantam River east to the Bantam, thence in



POWER-PLANT AT THE WEST END OF THE SHEPAUG TUNNEL IN NOVEMBER, 1923
In October, 1924, this plant was dismantled and moved to the east end of the tunnel

the same direction toward Bantam Lake, under the narrows of this lake in a southeasterly direction, and east again to the branch reservoir on the west branch of the Naugatuck River, a total distance of seven miles. A construction camp and power-house were built at the west portal of the tunnel, and in July, 1922, rock excavation was started.

With a small plant consisting of two locomotive type boilers, an air compressor, two electric generators, a forge and sharpener for drill steel, and a pump to lift water from the river, the tunnel, which is of horseshoe shape and approximately 7 x 7½ feet, has been driven from this portal, a distance of 6,500 feet. The rock is hard mica schist with occasional strata of very tough hornblende. The frequent changes in the nature of the formation introduced difficulties, and at times the work was so wet that it was necessary to lay a pipe line and put in compressed-air and electric-driven pumps to remove the water.

EAST PORTAL OF THE SHEPAUG TUNNEL, AT BANTAM RIVER

Driving the Tunnel

As is customary in tunnels of this size, a full face heading was carried. The standard round comprised either nineteen or twenty-one holes, including eight cut holes arranged to break a vertical V cut. The holes were drilled to a depth of 8 or 10 feet, depending upon the character of the rock, with two water Leyner drills set up on vertical columns. The holes were loaded with 60 per cent gelatin dynamite, 1¼ x 8 inches, tamped with sand in tamping bags, and fired by electricity taken off the lighting current. Ordinarily the cut holes were fired first, with No. 6 electric blasting caps; then the remaining holes were loaded, using the electric blasting caps in the relief and breakdown holes, first delay electric blasting caps in the roof and rim holes, and second delays in the lifters, and were all fired in a second shot. At times when the heading was in relatively soft ground and no relief holes were necessary, the whole round was

connected in one series and fired in a single shot, the charges exploding in rotation.

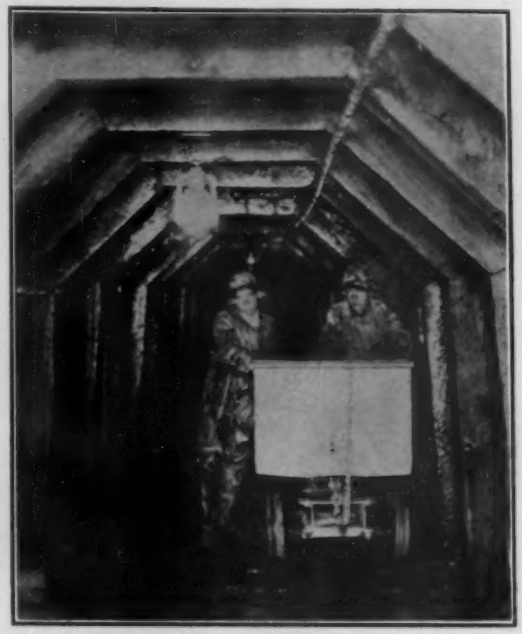
As soon as the smoke and fumes cleared away sufficiently—and this was aided by a ventilating system composed of a reversible fan and a 12-inch pipe carried to within about 275 feet of the face—inspection of the face was made to see whether any "guns" had been left, that is, ends of bore holes which had not broken clear to the bottom. If so, these were loaded and fired to square up the face. A crew of three men then shoveled the muck back from the face far enough to enable the next shift to set up the drills and drill the next round. While this was being drilled and loaded, the mucking crew of eleven men loaded the muck and it was hauled out of the tunnel by an electric storage battery locomotive.

The muck cars, which are of the side-discharge type with wooden bodies on steel trucks, were designed and built on the job at a considerable saving per car over the all-steel car on the market. They stand up well in use and when damaged can be cheaply repaired.

Operations in this heading were carried on in two shifts, working day and night, and the rate of progress, which was creditable from the beginning, steadily increased. From the time the rock work started, on July 15, 1922, up to cessation of work in this heading in April, 1924, the average monthly progress was 287 feet. For 1922 the monthly average was 200 feet; for 1923 it rose to 302 feet; and for the first quarter of 1924 to 353 feet. The maximum advance in any one month was made in January, 1924, when a distance of 386 feet was driven in 54 shifts. The greatest progress in any one week was registered in December, 1923, with 94.4 feet in 12 shifts. The best weekly single shift record in this heading was 50.6 feet in 6 shifts.

Other Headings

In addition to the Shepaug River heading, three other headings have been started, one on the west bank of the Bantam River running westward to meet the Shepaug heading, one on the east bank, which will be driven to the shore of Bantam Lake, and another westward from the tunnel outlet on the west branch of the Naugatuck River. As the line of the tunnel running west from the Bantam River crosses a swamp, it is necessary to make an open cut there and build a concrete section. Most of the tunnel will not be lined with concrete but will be left as a natural rock channel. Between the two portals on the Bantam River a pipe line will be sunk to carry the water under this river. The plant at this location is equipped with three Economic type boilers and two two-stage air compressors of 800 and 1,000 cubic feet per minute capacity. Excavation in the new headings is being carried on by much the same system that was followed in the original Shepaug heading, and an excellent progress of 400 feet per month is now being maintained.



A TIMBERED SECTION OF THE SHEPAUG TUNNEL AT THE WEST END

The men are paid somewhat on the piecework basis; that is, they receive a regular amount for drilling and loading each round, or for shoveling the muck, and quit work as soon as that job is completed. In addition, each shift is paid a bonus for any progress made by it above 36 feet per week. This system stimulates steady work and creates rivalry between the two shifts. A good rate of progress is being secured because the resident engineer closely supervises every phase of the work and because he and his assistants have the faculty of dealing with men and getting results from them, an admirable quality in any leader.

When Bantam Lake is reached, it will probably be necessary to sink a shaft and set up another plant. Just what conditions may be met in boring under this lake is still somewhat uncertain.

Forward Steps in Municipal Affairs

Training a Dynamite Squad in the Fresno Fire Department

FRESNO, CALIF.—Since the reorganization of the Fresno Fire Department two years ago, a strong effort has been made to develop this department into one that is completely educated along all lines necessary to make it competent and efficient. To that end, schools and drilling on hydraulics, chemistry, electricity, building construction, and other subjects, have been held.

There has also been in the minds of the chiefs of the Department for some time a determination to organize a dynamite squad that would be worthy of the name; in other words, a squad capable of operating efficiently whenever an emergency might arise. The formation of such a squad, however, was delayed until certain other school work had been successfully carried through, and particularly until the services of a recognized expert to conduct the school on the use of high explosives could be secured. The Department has been fortunate indeed in obtaining for this purpose the services of J. C. Costello, Assistant Sales Manager of the Giant Powder Company.

Prior to the beginning of the actual school work under Mr. Costello's direction, we succeeded in arranging for visits from six or seven recognized high-explosive experts. These men gave illustrated lectures on high-explosive work, thus building a foundation for the school which was to follow.

The dynamite squad was organized as follows: 14 members of the Rescue Squad Company; 4 district chiefs; 4 members of the Fire Prevention Bureau; and the Department Drill Master. The course was commenced with lectures, and later, arrangements were made for practical instructions in the use of explosives. The usual preliminary work in the way of digging trenches, etc., was done, and then, under the supervision of their director, the squad proceeded to dynamite a large brick tower. So efficiently was this piece of work handled, that the tower collapsed within itself, with no part of the tower falling more than 20 feet from its base.

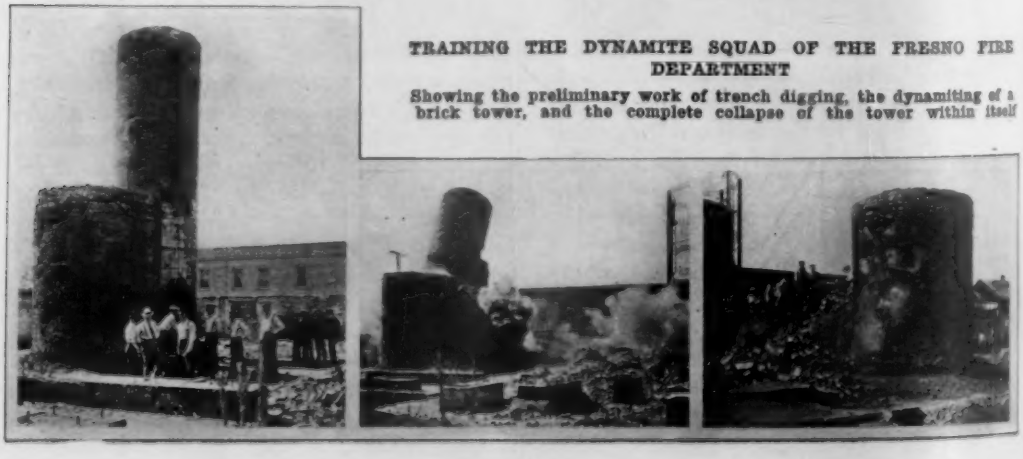
By having trained a dynamite squad of more than twenty men, we are almost certain to have in any emergency a number of men who will know how to carry on the work and who can intelligently direct the operations of less experienced men. This same theory has been applied in the instruction of the Department along all other lines, and the members, appreciating this opportunity for education, have taken every advantage of it. The Department feels that its efforts in this direction have been well repaid by the increased efficiency that has been evident in the work of the members on the whole.

THOMAS BAIRD,
Chief Engineer, Fire Department.

How a Small City Secured a Large Pool for Swimming and Skating

GARDEN CITY, KANS.—The construction of an all-concrete municipal swimming pool, that we believe to be the largest in any small city in the country, is an achievement of which this community of about 4,000 population is justifiably proud. The pool is 345 feet long, 210 feet wide, and has a depth of from 18 inches to 9 feet. Its entire cost amounted to about 16,000.

In February, 1922, the Board of City Commissioners conceived the idea that a large swimming pool was much needed in western Kansas, and that Garden City, lying in the well-watered Arkansas Valley and along the route of the Santa Fé trail, would be an ideal location for such a recreational feature. Realizing that the city could not afford to finance the project through taxation, the Board appealed to the Garden City Chamber of Commerce and other local organizations for assistance. With the aid of these groups, contributions amounting to over half the estimated cost were received. An attractive site for the pool was found in Frederick



TRAINING THE DYNAMITE SQUAD OF THE FRESNO FIRE DEPARTMENT

Showing the preliminary work of trench digging, the dynamiting of a brick tower, and the complete collapse of the tower within itself

GARDEN CITY, KANSAS—IN THE WATER AND ON IT

Finnup Park, a 100-acre tract of valuable land recently donated to the city by George W. Finnup, and definite plans for the construction work were soon under way.

To supplement the cash donations, the Chamber of Commerce solicited the cooperation of some local business men in working out a novel scheme whereby the necessary excavation work was completed without cost to the city. From these business men the Chamber secured a list of honest debtors who were out of employment at the time, and to these debtors the proposition was made that if they would furnish teams and men for the excavation job, the value of the work done would be credited to their outstanding accounts. This proposal was cheerfully accepted. Then the same proposition was presented by the Mayor before a meeting of the Garden City Elks Lodge, and 47 additional men and teams were supplied through that group.

Some idea of the popularity of the municipal pool may be gained from the fact that often during the heat of the summer as many as 500 bathers are in the water at one time. And during the ice-skating season, the pool again becomes the center of attraction to the crowds of enthusiasts for this winter sport.

H. O. TRINKLE,
Mayor.

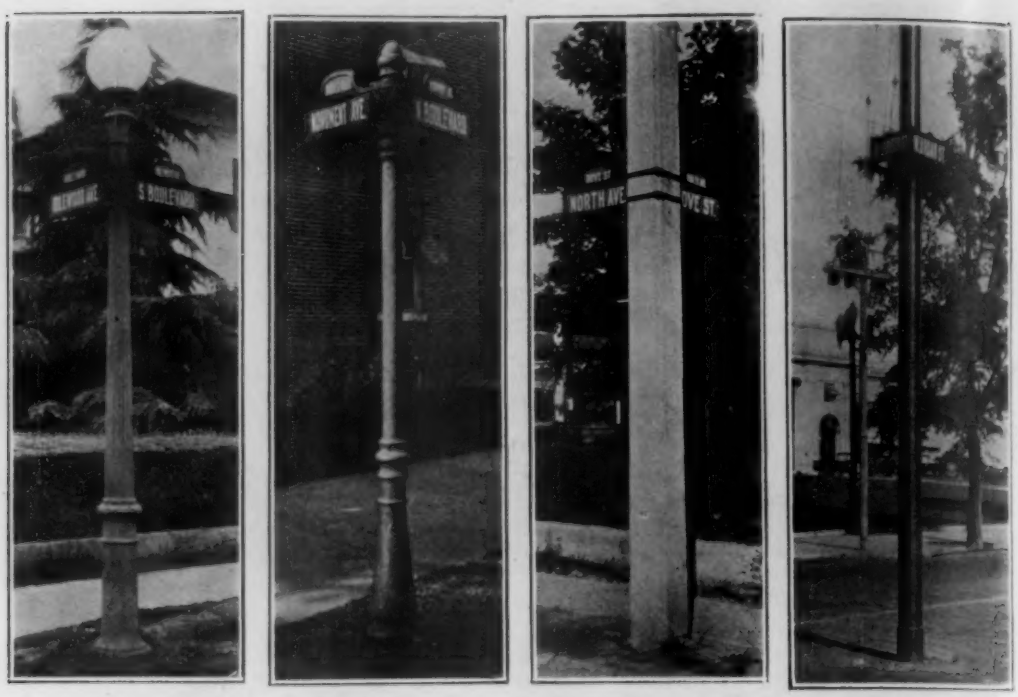
Street Signs for Richmond

RICHMOND, VA.—Until about nine months ago, Richmond was one of the few large cities in this country that had no system of street marking. While the need for adequate street signs was often felt, the work was continuously postponed because of the lack of funds for this particular undertaking. Finally, on June 15, 1923, the City Council made an appropriation of $10,000 for street signs, and later a second sum of like amount was added to the fund. It is estimated that it will require a total of $75,000 to mark all street intersections in the city.

In order to determine the most logical points at which to place the signs, and to estimate the cost of erection, the Bureau of Surveys of the Department of Public Works made a survey of each street corner, taking note of fire-plugs, poles, sewer inlet castings, and other obstructions, in addition to noting the type of sidewalk surface in each case. With the survey completed, and the first allotment of funds available, the responsibility for the actual erection of the signs was placed in the hands of the Director of the Department of Public Works.

In many cases it was found possible to utilize existing poles. Some of these were ornamental iron street-lighting poles and iron gas lamp-posts, owned by the city, that had been out of use for a number of years. Others were iron or concrete trolley poles owned by the transportation company, and the permission of this company for the attachment of the signs to its poles was secured. Plans were made showing the present dimensions of typical sections of the existing poles at the height above the ground at which we wished the signs placed, a clearance of 8½ feet from the ground to the bottom of the sign being allowed. Specifications were then prepared and sent to eight or ten leading sign makers, with request for estimates for furnishing their various types of poles, signs, brackets, etc. Samples of signs and attachments were required to be submitted with the bids.

The task of awarding the contracts was a difficult one and required considerable time and thought. It was finally decided to place with the Municipal Street Sign Company an order for their wing type signs and new iron poles, in addition to thirty-seven special box type signs for use on the city's main business street. These box type signs were placed on existing iron trolley poles in the center of the street. We also ordered from the Massey Concrete Products Corporation sixty-six concrete poles, and wing type signs to be attached on special bronze brackets. All iron frames, poles, etc., were given a coat of red paint



FOUR METHODS OF MOUNTING STREET SIGNS IN RICHMOND

before being shipped to the city, and upon their arrival here they were given two coats of green paint before being erected.

A porcelain enamel type sign was chosen.

The general plan adopted for placing the signs was as follows: On one-way streets, with a parkway in the center, signs were placed on the far corner in the direction of traffic at each intersection. On two-way streets, only one sign was placed at each intersection, these alternating from side to side so that each line of traffic may see the sign on the far corner at every other block. On the main thoroughfares, two signs were placed at each intersection, parallel with the curb, on diagonal corners.

We believe that Richmond will have no cause to regret the amount of money expended for street signs, and we are confident of being able to convince the City Council of the necessity for appropriating sufficient funds to complete the work. Not only are the signs of value in the matter of indicating the name and direction of the streets, but they give the streets a finished appearance of which we may well be proud.

J. N. EUBANK,
Chief, Bureau of Streets.

Pamphlets on Child Care Replace Health Department Bulletin

BRIDGEPORT, CONN.—A new form of public health publicity has been inaugurated by the Bridgeport Department of Health, which it is believed will prove much more effective than the monthly bulletin heretofore issued.

It so happens that the Department, in its Bureau of Child Hygiene, has available enough nurses to make a visit each month to every home in the city in which during the year a baby is born. The births of these infants are of course reported to the Department, and within twenty-four hours after the receipt of the report, a nurse calls at the home to deliver a certificate of birth to the parents, and to give them such advice as she may in the care of the child. Beginning on January 1, 1925, the nurse will deliver, in addition to the certificate, a small loose-leaf binder in which the certificate will be placed, and in which will also be enclosed the first of twelve pamphlets relating to the care of the child and of other children in the family. Each month thereafter, for twelve months, when the nurse makes her regular visit to the mother, she will ask for the binder and will place within it another leaflet. As there are somewhat over three thousand births in Bridgeport each year, we will in this manner reach that number of families, rich and poor.

For many years the Department issued a monthly bulletin, "Bridgeport's Health," to the preparation of which much time and thought were given. It became apparent, however, that this bulletin failed to reach the great mass of people in the community to whom it would be of most value. It did, of course, reach a rather large number of certain individuals, members of local organizations and of the city government, merchants, business executives, etc., among whom it perhaps succeeded in stimulating an interest in the Department and its activities. While this is desirable in any community, it is even more desirable that the Department in some way reach the still larger group who make up the majority of the city's population. So the bulletin was discontinued, and the scheme outlined above will carry out in part the educational program of the Department.

As years go by, the percentage of the population

reached through the nurses' visits will no doubt increase, and it is possible that the plan, if it meets with the success that we believe it will, may be extended to include other families with whom the nurses come in contact during these visits.

W. H. COON, M.D.,
Health Officer.

Cooperation Between Public School and Traffic Officials

HARTFORD, CONN.—The following is the essence of a working agreement which has been put into effect in Hartford for the prevention of traffic difficulties in connection with school children:

1. That the principal of each school will talk with the police officers on duty at near-by crossings on problems of school traffic.
2. That traffic officers will report, to the principal of the school involved, cases where the carelessness or wilfulness of individual children is causing the officer difficulty.
3. That each school will be provided by the Board of Education with a blue-print map of the streets of Hartford, to be known as the Accident Map, on which accidents will be recorded by push pins as they occur.
4. That, wherever possible, arrangements will be made at a school assembly or otherwise to have police officers in uniform speak to the children on care in avoiding accidents.
5. That the Superintendent of Schools and the Chief of Police or his representatives will as speedily as possible inspect the individual traffic crossings and make whatever recommendations seem necessary to their individual departments.
6. That a pre-view of a film on safety now being worked out by the Department of Motor Vehicles will be arranged at one of our schools when the film is ready.
7. That, wherever possible, school authorities will work out a more complete monitor system to keep the children on the sidewalk until they reach points made safe for crossing.
8. That the Chief of Police will direct the officers to require the children to stand on the sidewalk, that is, not to step from the curb until the signal is given.
9. That the Commissioner of Motor Vehicles will send a photograph of the map of Hartford showing traffic accidents during the past year.
10. That the Superintendent of Schools will arrange for a later conference between the members of the Principals' Club and a representative of the National Safety Council to determine where, if possible, safety instructions may be incorporated as a regular part of the course of study.

This plan is working out wonderfully well. Not only is it helping to reduce accidents to the children of to-day, but it is believed that these lessons in safety will be so deeply instilled that they will continue to be effective when the boys and girls of to-day become the men and women of to-morrow.

GARNET J. FARRELL,
Chief of Police.

A Friendly Greeting to Motorists

DELAVAN, WIS.—Motorists entering Delavan by any one of the four state highways that pass through the city are welcomed by the sign illustrated herewith, erected by the Citizens' League of Delavan. By suggesting to motorists that they drive leisurely and enjoy beautiful Delavan, instead of facing them with the customary warning, "City Limits—Observe Speed Laws," the Directors of the League felt that the same purpose could be accomplished and at the same time visitors would pass on with a more friendly feeling towards the town.

Tourists are further impressed with the fact that Delavan is a friendly community by signs on the highways reading "Motor Police," also erected by the League. These serve to call the drivers' attention to the fact that a motor patrolman is on the job. The officer, too, has been given strict orders to keep in the open at all times, and it has been made clear that his duties are to advise and direct tourists and to arrest only for excessive speed or reckless driving. He also has on hand

SCHOOL CHILDREN IN HARTFORD MUST NOT STEP FROM THE CURB TO CROSS THE STREET UNTIL THE "GO" SIGNAL IS GIVEN

THE FRIENDLY GREETING AT THE CITY LIMITS OF DELAVAN, AND ONE OF THE STREETS WHICH LEISURELY DRIVING WILL HELP THE MOTORIST TO ENJOY

a supply of small printed cards, gotten out by the League, for presentation to visitors. These cards urge motorists to make their stay in Delavan more enjoyable and to avoid accidents by the observance of the few traffic rules listed thereon. In addition, the cards contain a few interesting facts about the town, and suggest that those wishing road maps and other tourist information call at the offices of the League, where such help will gladly be given.

RAY O. WIKER,
Executive Secretary, Citizens' League of Delavan.

City Manager Introduces His All-Star Cast

THE third yearly episode in the drama of modern city government under the council-manager charter in Clarksburg, W. Va., during the year ending June 30, 1924, is presented by City Manager Harrison G. Otis in his recently published annual report to the City Council. The members of the all-star cast are introduced, and the results of their respective performances are summarized in part as follows:

The Finance and Accounts Department received high praise from the State Tax Commissioner's office. The Treasurer's cash balance for the year was the largest on record. The number of building permits issued exceeded that of former years, and the valuation of new buildings was more than twice that of two years ago.

The Police Department established a record for liquor arrests, and for the arraignment of criminals and the recovery of stolen property.

The Fire Department won commendation from the State Fire Marshal. Last year's per capita fire loss and loss of uninsured property were lower than in any previous year.

The Health Department was placed on the vanguard of health units by the State Health Commissioner. A phenomenal reduction in contagious diseases and a lower baby death-rate marked last year's progress.

The Public Service Department broke all records for the amount of street improvements, miles of road cindered, and the erection of street signs.

The Recreation Department's playground methods were featured in magazine articles, and were editorially praised in several of the nation's largest dailies.

The Public Library's circulation record jumped to nearly three times that of three years ago, and more new books were placed on the shelves than in any previous year.

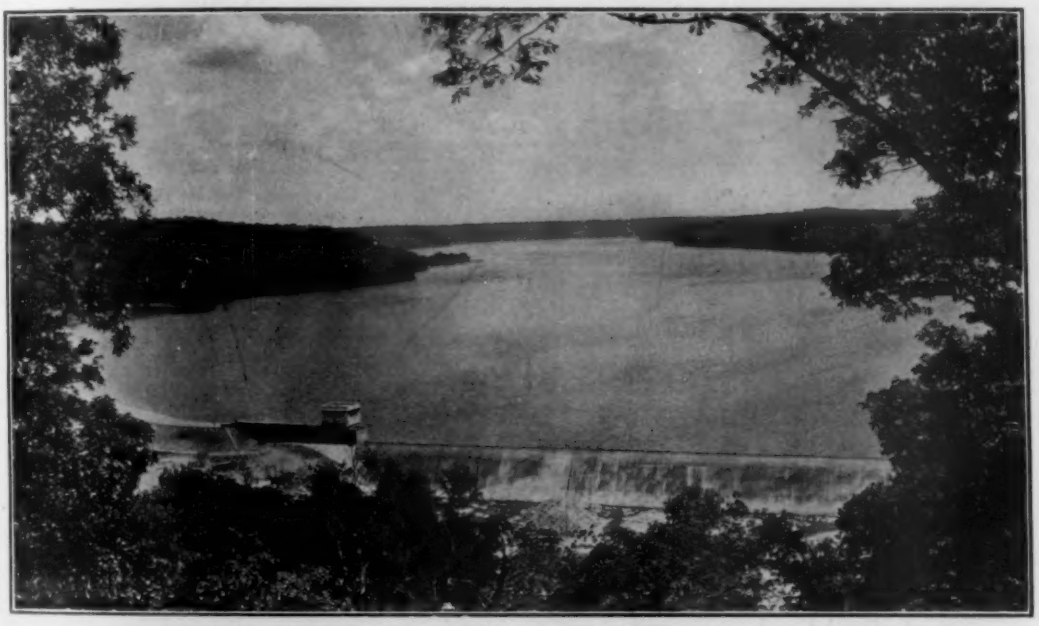
The Legal Department saved the city thousands of dollars in defending damage claims and in enforcing collections in favor of the city.

The New Water-Supply for Tulsa, Oklahoma

By W. R. Holway
Chief Engineer, Spavinaw Water Project, Tulsa, Okla.

DURING the last ten years the tremendous development of the Southwest has been one of the noteworthy facts of our national growth, a development not only industrially and agriculturally important, but record-making in the matter of civic achievement. Oklahoma has been a center of development and Tulsa one of the fastest-growing cities. Its population has risen from 18,900 in 1910 to approximately 111,000 in 1923. The cause of this remarkable increase has been the proximity to the rich oil-fields of the mid-continent section, and the spirit of the citizens, who have looked ahead and planned for the future on a big scale.

The water problem has been one of the biggest with which the city has had to deal, for almost as soon as the first wells were dug, it was discovered that they were going to be entirely inadequate as a source of supply. Then the city turned to the Arkansas River. Although there was an unlimited quantity there, the quality was extremely bad, for the Arkansas is one of the hardest, saltiest, and muddiest rivers in the Southwest. The water is not suitable for domestic use because of the salt content, which has been as high as 2,400 parts per million, salt flushed from the creeks of the oil country and from the salt plains of Kansas. The whole city purchases its drinking water in five-gallon bottles. The water is not suitable for industrial uses because it is so hard that only the most expensive filtration process will soften it. For some months of the year the water is not fit for any use whatever, on account of its mud content, which sometimes becomes even too heavy for the modern filter plant which Tulsa built in 1918, and which usually handles the purification of the water in an efficient manner.



SPAVINAW LAKE, SHOWING DAM AND GATE-HOUSE IN FOREGROUND

About a decade ago, when Tulsa's population figures began to increase by leaps and bounds, the builders of this city saw that good water was to be an imperative necessity. Up in the Ozark Mountains, 60 miles to the northeast, were clear, sparkling streams of cold, soft water, and one of the most beautiful of these streams was the Spavinaw. Certain far-sighted citizens began to talk of the possi-

bility of bringing this water to the city, and various plans were suggested. In 1919, a bond issue for $5,000,000 was proposed for a plan whereby an expensive pumping and power system would bring the water to Tulsa; and this issue passed by a good majority, so eager were the people for a good water-supply. Later this election was declared void because of a legal technicality. In 1921, by a charter amendment, a non-partisan water commission was appointed, consisting of four members, two to be elected every two years, and the Water Commissioner to be Chairman. This commission invited George W. Goethals to come to Tulsa and look over the situation and recomend a course of procedure. His recommendation was for the Spavinaw source, if a preliminary survey showed this to be a feasible plan. This survey was carried out in the summer of 1921 by the Holway Engineering Company of Tulsa, after a bond issue of $25,000 had been voted for this purpose.

The report of the survey presented a gravity plan for bringing Spavinaw water to Tulsa and stated that the cost would be $6,800,000. In November of the same year a bond issue for that amount was voted, 5 to 1. This was one of the largest per capita bond issues ever carried for water-supply in this country. In April, 1922, W. R. Holway of Tulsa and J. D. Trammell of Fort Worth, Tex., were retained as engineers, and Dabney H. Maury of Chicago as consulting engineer, and work was immediately started on the final surveys and preparation of plans and specifications. In September, 1922, eleven contracts were let on this work. Later, six more were let, and $700,000 additional in bonds voted. In February, 1924, the contractors for the laying of the concrete pipe abandoned their contract and the work was completed by the city under the direction of W. R. Holway, Engineer for the Water Commission. A rather unusual thing was accomplished here, for the contractor's superintendent and foremen were replaced with men from the engineer's organization, and the whole work was carried to a successful completion in October, 1924, almost exactly two years from the date of letting contracts. On November 17, the city fittingly celebrated the turning of the water into the mains.

Precast Concrete Pipe Used

The most important question to be decided at the time of letting contracts on this work was the type of pipe to be used. The final decision was in favor of precast, reinforced concrete pipe, for the reasons that it was especially adapted to the low head under which this water would flow, it was comparatively cheap, and was permanent. The make of pipe adopted was the Lock Joint reinforced concrete pipe, and the sizes 60 and 54 inches, 28 miles of the former and 25 miles of the latter. This conduit will furnish 25,000,000 gallons of water per day. The manufacture of this pipe was accomplished in an efficient and noteworthy manner, for the whole 53 miles was made in 13½ months. The plant, which covered 40 acres, was located about 20 miles east of Tulsa on the Frisco Railroad. Nearly all of the raw material except steel came from Oklahoma points. A complete standard-gage railroad served the yard and brought in this material and moved the finished

SECTION OF THE CONCRETE PIPE LINE, SHOWING THE CONSTRUCTION RAILROAD AND ONE OF THE AMERICAN LOCOMOTIVE CRANES

TIMBERING IN THE TIOWAH TUNNEL IN SECTION 3-A OF THE SPAVINAW WATER PROJECT

pipe. Four units, each with a capacity of ninety-six 12-foot lengths per day, worked independently and simultaneously. Double gantry cranes handled the forms, reinforcements, and finished pipe, and poured the concrete. Great care was taken to insure a dense, smooth concrete. Tests on approximately half the line show a leakage far below the specifications of the contract. Each length was ·d for a certain head, and so had to be distributed to a certain point on the line.

The determining factor in the time problem of this project was the distribution of the pipe, each joint of which weighed 6 tons. There were five railroads and ten good-sized streams to cross. A standard-gage railroad was built paralleling the entire pipe line, and the maintenance of this railroad during the rainiest years Oklahoma has ever seen was one of the difficulties of the project. But after the city took over the work, the railroad was successfully operated.

Midway of the conduit is a ridge 2 miles wide. Through this a tunnel, 7 feet in diameter, with 84-inch monolithic approaches, was constructed. In order that Tulsa might extend the water system without having to bore a new tunnel, this was designed to carry three times the capacity of the pipe line.

Impounding and Storage Reservoirs

A 55-foot solid masonry dam, 3,500 feet long, impounds approximately 20 billion gallons of water, forming Spavinaw Lake, 6 miles long and covering 1,800 acres. This reservoir site is one of great beauty, lying in a narrow, wooded valley. Although Spavinaw Creek, at the dam site, is at the same elevation as the Arkansas River, on the banks of which the city of Tulsa is built, the water flows entirely by the force of gravity from Spavinaw Lake to the receiving well at Mohawk pump-station. This is made possible by the fact that Bird Creek Valley, 5 miles north of Tulsa, is 50 feet lower than the Arkansas. This 50 feet, together with the 50 feet obtained by building a dam on Spavinaw Creek, gives sufficient head for the gravity flow. At Mohawk a large storage reservoir has been built, holding 500,000,000 gallons, which will serve as an emergency supply. On the bank of this reservoir is the pumping-station, which lifts the water through a 30-inch steel pipe to a concrete-covered distributing reservoir one mile north of the city, from which it flows directly into the city mains. This latter reservoir holds a little more than one day's supply.

The successful carrying out of a project involving 7½ million dollars in so short a time was possible only by reason of the fact that the entire project was handled by a Board of Water Commissioners, consisting of five of the leading citizens of the city, who have given freely of their time, energy, and judgment, to assure their city of the best possible water-supply in the shortest possible time at the least possible cost.

Period of Loans on Road Work

THE Finance Committee of the Cheshire, England, County Council has considered the policy of not permitting loans to be sanctioned for main road and bridge purposes for a period exceeding the life of the work, according to *Roads and Road Construction*, London, England. The following estimates of the expected life of foundations, pavements and bridges have been determined as fair averages.

Foundations	10 years
Water-bound macadam pavements	8 years
Tar macadam	5 years
Asphalt	7 years
Granite block paving	15 years
Land	20 years
Bridges	30 years

A Plea for Imagination in Playground Design

By Horace W. Peaslee

Park Architect, Washington, D. C.

WHEN I think of playgrounds—not the exceptions, but the average run of playgrounds—a definite visual image presents itself, an image of large areas void of planting and sparse of turf, of pipe-framed swings and pipe-framed bars and divers other mechanical contraptions, of much organized and systematized effort. There is such a prevailing uniformity of type, based no doubt on certain well-founded ideas of operation, that one can find little trace of the park or landscape designer's handiwork within the borders, little evidence of individual handling by a designer who takes nothing for granted, but questions and studies each and every point as he meets it. With your permission, I am going to raise some of these questions without attempting to answer them.

Is there no common meeting ground of the park system and the playground system? Must the playground maintain itself as a unit of such obnoxious bulk that it cannot be swallowed by any park scheme? Is it possible for the playground camel to be content with his head alone in the park tent, or will he proceed to oust the master if admitted?

If the park comes to the playground, must it be restricted to the outermost edges? Cannot the play scheme be broken up into smaller units with their definite lines of demarcation? Must playgrounds always lie in the open?

Must there always be the same combination of equipment? Must it always be of the same standardized, obviously efficient type? Is it subject to adaptation and modification to lend itself to park conditions? Can it be broken up into occasional units placed where oportunity permits and used without supervision?

. . . . .

A quaint old French print shows the central feature of a garden to be a combination of seesaw and merry-go-round. A Colonial garden shows a "bouncing-board" of similar characteristics. Is it too difficult for the modern park designer to incorporate such a feature in any part of any park? They were sightly enough to be elements of design in the old pictures. Even the grown-ups were not too dignified to indulge occasionally.

. . . . .

In a Zurich park, there's an open space surrounded by trees. In the center of the space is a hill of sand. A careless grown-up might call it a small mound, but to the child it's as difficult to scale as the treacherous Mount Everest and as easy to descend as a splinter-proof slide. There's no lawn to spoil, just a natural woodland floor. It's unquestionably the children's corner, but instead of spoiling the park for the adults they actually sit around there to watch the play.

. . . . .

Consider the wading pool, usually as stiff and formal as a bathtub and therefore fundamentally obnoxious to the child. There's nothing exciting about it. Now regard the possibilities of our Rock Creek or your equally precious park brook at the place where every once in the while it overflows and spoils the scenery. I wonder if it would suffer by designation as a Junior Navy Yard. Considering the crudeness of an existing boulder dam, I do not believe that a pair of low barriers, about like fords, would injure the appearance—and think of the possibilities for navigation and manufacturing-plants. I recall a group of boys who constructed such dams across a little stream and dug canals with locks and made mill-wheels out of cigar boxes and battleships out of everything. Every little freshet would wipe the slate clear for another effort—and consider the value of the experiments and the experience.

Aside from a few squirrels and birds, what do the parks provide of special interest to children? In statuary, practically nothing. Of local interest, there's a jumping horse in Lafayette Park and one sitting down at Sheridan Circle. I have never seen a statue of Santa Claus or Robin Hood or of Little Lord Fauntleroy. London has its Peter Pan. Berlin has its Children's Garden with the statues of Little Red Riding Hood and other characters of definite interest. Would it be asking too much of a park designer to produce one little Garden of Goblins? There are quaint little grotesques just suitable for the purpose. Precedent? Why years and years ago, one Matthew Vassar who was serious enough to found a college could unbend sufficiently to deck his garden with amusing French grotesques of dandies and beggars and soldiers

and the like. It would be a wonderful accomplishment both for the children and the public if we could even collect in one place, carefully screened, all the cast iron dogs and deer once so popular for lawn adornment but now becoming so rare that, like shell flowers and Rogers statuary, they bid fair to again become *objects d'art*.

Some day I hope to do a Children's Park. It will start off with plenty of established trees, with the shrubbery thus kept up in the air out of the way. Undergrowth will be disposed so as to follow the lines of least resistance. There will be plenty of elbow-room, plenty of good, plain dirt and plenty of smooth pavement, each for its special use. There will be a Mystic Maze and a Tunnel and a Tower, also an unexpected slide and a secret fountain, in the best Italian manner, to show the new boys. And the statuary will be strictly appropriate. What was once known as the playground will be called the Circus. It will be enclosed by a low wall with a long seat on a platform, like a hippodrome. The apparatus will be quite spectacular in form and color. There will be some animal with an infinite capacity for peanuts—not a camel. Grown-ups will be admitted as spectators. I anticipate that the Scout organizations will be in charge.

It is unnecessary to go to such extremes immediately, but special opportunities are always at hand. For example, we have in Georgetown an abandoned reservoir shaped like a beehive and open at the top like the Pantheon. The ground has been filled around it almost to the top, and there after a long climb one finds a river view. But imagine that reservoir shell opened at the bottom to the street level and at the top with barred windows from the promenade. It might be a skating-rink; it would be a wonderful play palace even on a rainy day. And the echoes go round and round, never reaching the neighbors.

No two cities present the same problems or the same opportunities, and no general prescription can be given. I have merely tried to raise the questions with you for your answer in your own case. The main plea is to regard the playground problem, not as a solid obstacle to be camouflaged by the arts of landscape design, but as a group of elements to be studied anew for their possibilities as individual park features.

From a paper read before the joint meeting of the American Civic Association and American Institute of Park Executives, at Washington, D. C., October 8, 1924.

Landscaping, Fencing and Surfacing of Playgrounds

IN developing a playground the element of beauty must not be overlooked, yet as much free play space as possible must be preserved. Flower-beds or shrubbery have no place on the playground except in irregular corners. They take up too much valuable space and require an exorbitant amount of time and labor in maintenance. If shrubs are desired as screens, the fence should be set back, and the shrubs planted between the fence and the sidewalk, but not close enough to the sidewalk to interfere with pedestrian traffic. Trees should be planted close to the border of the playground, or near the apparatus to afford shade. Trees of low height and giving dense shade as quickly as possible should be planted in preference to slow-growing elms.

All playgrounds should be fenced, not only because fences improve the appearance of the playground and the abutting property as well, but because it is a safety first measure. Children are not apt to run heedlessly off the playground and under the wheels of traffic if there is a fence around the playground. Fences also reduce the problem of landscaping, as flowering vines, rambler roses, and other climbing species of plants planted along the fence greatly improve the playground. The fence should be five to seven feet in height, barbed at the top to prevent climbing. The fence should be constructed of two-inch mesh, chain linked, galvanized after fabrication steel wire, with galvanized steel posts and top rail.

Surfacing is a big problem. It is difficult to make grass grow when it is being constantly trampled down, yet a bare playground is unattractive, and the dust is a big nuisance to the neighboring housewife. A suitable playground surface must be porous enough for drainage, yet firm enough to stand up under constant use when it is wet, and not raise a dust when it is dry. Gravel, cinders, cement, have not proved satisfactory. Asphalt is too expensive and hot.

Detroit has found that a surfacing of limestone screenings and calcium chloride has proved very satisfactory. It is porous, drains easily, can be used immediately after a rain. It does not develop soft spots. It is soft after a thaw, yet packs down readily after the frost is out of the ground. This surfacing has a foundation of four inches of hard cinders, wet down and rolled with a steam roller. (Cinders must be kept wet while rolling.) Next, three inches of limestone screenings is applied. This also is wet down and rolled to a true grade with a horse-drawn roller. Calcium chloride is applied at about 1½ pounds per square foot. Then, ⅛-inch of a sharp torpedo sand is put on. The calcium chloride absorbs moisture from the air, and forms a binder coat with the sand and limestone screenings, giving a smooth, white, dustless finish to the playground.

Buildings, especially lavatories and storage space, are absolute essentials to a playground. The design of such buildings should be equal to, or better than, the surrounding architecture. The buildings should be made of brick, stone or cement. Wooden buildings should never be erected, as they soon become an eyesore rather than a benefit, showing the effects of wear and

abuse, which unfortunately the American public gives to its public buildings. Wooden buildings are a source of big expense in maintaining. Buildings should have limited plantings of shrubs around them; climbing vines are preferred.

Playground apparatus should be sufficient to meet the demands of the playground. It should be made of galvanized steel pipe guaranteed against rust. Rusty apparatus frames, and usually those made of wood, are unsightly. Large gym frames, or "plumbers' exhibits," as they are often called, are not recommended unless located upon playgrounds in communities which know the value of and how to use them—such as the Turnverein, sokols or other national gymnastic groups.

—From the Report of the Playground and Recreation Committee of the American Institute of Park Executives, presented at Washington, D. C., October 9, 1924, by C. E. Brewer, Chairman, Commissioner of Recreation, Detroit, Mich.; J. R. Batchelor, Playground and Recreation Association of America; V. K. Brown, Superintendent of Recreation, South Parks, Chicago, Ill.

A City Club's Weekly Luncheon Programs

THE City Club of Portland, Ore., serves a wide assortment of information with its weekly luncheons. This club, whose membership comprises about a thousand of the leading business men of the city, purposes "to inform its members and the community in public matters and to arouse them to a realization of the obligations of citizenship." A Portland business man, by attending these luncheons each Friday for the past year, as several hundred of them do, is now well informed on a large range of the issues of the day, for these talks, almost without exception, are made by experts in various fields.

The City Club has seven sections: city planning; government organization and public finance; education and recreation; port development and public utilities; public health; public safety and defense; and social welfare. Most of the lectures may be classified in one of these fields.

City planning, a subject of appeal to any civic organization, provided a theme for several meetings. The Portland City Engineer spoke of the need of a city plan. The city Inspector of Buildings gave a timely talk on traffic control as a city planning problem, this at a time when the City Council was endeavoring to improve upon the present system and while the question was one of interest to every motorist and every pedestrian in the city. The Superintendent of Parks summarized Portland's achievements in parks and recreational facilities. Housing problems were discussed by a New York expert.

The rapid increase of population in Portland has resulted in the overcrowding of the schools to the point of decrease in efficiency. In view of this emergency, the school board wished to determine the possibility of establishing a work-play-study system on the basis of the Gary plan. Miss Alice Barrows, of the U. S. Bureau of Education, who spent several weeks in Portland making a survey of the school system, reported some of her findings, and William Wirt, Superintendent of Schools in Gary, Ind., gave a talk on the multiple use of school buildings through the work-play-study plan.

Features of government organization and public finance included the state income tax—perhaps the most discussed subject throughout the state—voting machines, farm finance, the present financial situation, and the business outlook. A comparison of Portland's harbor with that of other world ports was made at one meeting.

The fact that Portland, especially since the opening of the new University of Oregon Medical School, is rapidly becoming the medical center of the Northwest, may account for the emphasis on questions of public health. A speaker of the National Tuberculosis Association described the success of the present endeavors in this field. The work of the State Board of Health was presented by several of its members, who attended one session in a body. Pasteurized milk, foods and resistance, and the hoof and mouth disease were among other subjects discussed. The City Club by no means limits its program to matters of local or even of national interest, but has also gathered speakers and subjects from the world at large.

Allentown Realtors Help Save Taxpayers' Money

THE Allentown, Pa., Realtors through their Municipal Affairs Committee have taken the leadership in "getting their city out of the mud," through active interest in a local paving project, and saved the taxpayers a considerable sum.

During the spring and early summer the city government advertised for bids for paving, but such bids as were received were at prohibitive prices. This was due to the fact that permanent improvement of city streets was paid by assessment of the abutting property, the liens being given to the contractor doing the paving. Naturally, some of these liens were hard to collect and involved court proceedings. Under the circumstances, the contractor had to figure interest on the money tied up as well as cost of collection, making the cost of the improvement very high. This year's paving program was quite extensive, involving the paving of streets in sections where many very desirable new houses are under construction, and the delay threatened to seriously retard the city's progress.

The Municipal Affairs Committee studied the situation thoroughly, consulted with the Highway Department, and then recommended that an ordinance be passed authorizing the issuing of "construction bonds" by the city to finance this work, the city to collect from the property owners during the ten-year period as provided by law. An ordinance thus dealing with the situation was passed on first reading on Monday, July 21, 1924, and finally adopted; bids were advertised for, and three reliable bidders submitted bids. When the bids were opened, on August 30, 1924, it was found that the saving to the property owners will more than cover the carrying cost of the bonds.

This program, with its large saving of the taxpayers' money, was worked out, advocated, and passed solely through the activity of the Allentown Board, working in harmony with City Council.

—*National Real Estate Journal.*

NIGHT VIEW OF MAYWOOD INSTALLATION, SHOWING DISTRIBUTION OF LIGHTS

The Maywood, Illinois, Street-Lighting System

Complete Installation of 1,784 Lamps Made at Cost of $270 per Lamp

By F. Woodmansee

Woodmansee-Davidson Engineering Company, Consulting Engineers, Chicago

IN Maywood, a suburb of Chicago with a population of 12,000, there was installed a year ago one of the most complete residential street-lighting systems in the United States. It involved the erection of 1,784 posts for incandescent lamps. The outstanding features of this series type of street-lighting installation are (1) the compact design of the substation, (2) the completeness of the underground duct system, and (3) the use of individual disconnecting series transformers mounted in the base of the pole itself.

Although only 12 circuits are now in use, totaling 360 kw., the substation has ample capacity to allow the lighting load to expand to 800 kw. The main thought behind the design of the entire lighting installation was to insure complete harmony with the buildings and surroundings in this high-grade residential suburb. The Board of Trustees of Maywood desired an installation which would require minimum maintenance expense, because such charges are paid from the general expense fund, while the initial cost could be paid by a special assessment. Therefore, the trustees thought it advisable to install a sys-

DAYLIGHT VIEW OF SAME LOCATION AS ABOVE

tem which, while more expensive at the start, would be economical to maintain. For this reason an expensive underground duct system was installed, which finally resulted in a total cost of $7,290 per mile of street lighted.

A spacing distance of 165 feet, using a staggered system, was chosen in the main residential section in order to provide sufficient light for automobile traffic. For the business district it was necessary to obtain a much higher distribution of light. Accordingly, the lamps were placed about 65 feet apart. These circuits were made as short and direct as possible.

Energy is obtained from the Sanitary District of Chicago, which brings a 12,000-volt underground line into the 36-kw. substation at Sixth Avenue and St. Charles Road, Maywood. Here, in a space of 45 x 19½ feet, is contained all of the outdoor control-switching equipment that is used in serving the lighting and pumping plants of the Maywood district. In building the substation it was felt that to insure compactness and at the same time provide an auxiliary bus, special construction was best. Two-inch galvanized iron pipe furnishes the supports of the substation. The top of the station proper contains the three phases and a ring bus, the neutral. From these buses the circuits drop down through 30-ampere fuses to the voltage regulators. All the main buses and taps from the buses to the fuses and oil switchers are made of ½-inch copper tubing, while the taps from the fuses to the regulators and from the oil switches to the cable end bells are made of No. 1 solid copper wire. The bus-bar supports are rated at 7,500 volts. Available space is afforded for future extensions of this substation, should additional lighting circuits be necessary. With the substation mounted directly over the 6-foot wide duct, the circuits run from the regulators through the disconnecting switches directly into the cable duct sunk in the ground below the concrete piers. From here the circuits go to the outgoing feeders. By having regulators on both the other faces of this rectangular substation, much less space was required than if they were mounted all in a single straight line. The main buses are energized from the incoming line, by bringing the latter up from the 6-foot wide duct through 4-inch bituminized-fiber conduit to the 200-ampere, 4,000-volt oil switches and then on up to the main buses on top of the substation. Since the incoming circuits also feed the pumping load of Maywood, the 200-ampere, 4,000-volt oil switches on top of the substation are also employed as bus-sectionalizing switches.

THE HARP FIXTURE WAS USED BECAUSE IT IS EASY TO CLEAN

Although the substation is very compactly built, a space interval of 18 inches is kept between the buses for safety. All the oil switches mounted in this substation are operated as a unit from the ground by means of a 180-degree mechanism. While all this equipment is installed out of doors, provision is made for the installation of recording instruments within the main pumping-station. Both the current and the potential transformers are mounted below the main top buses. The circuits for these recording instruments run through three 1-inch iron conduits into the station. Because of the fact that this installation was built in the street over an old sidewalk, it was necessary only to construct a concrete base for about three-quarters of the foundation. Continuity of transformer service is guarded by the installation of a duplicate set of transformers. The method of numbering the circuits on one side as odd and even was followed for the purpose of ready identification of circuits.

The Conduit System

The reasons for the choice of an underground duct system, besides those mentioned above, were several. In the first place, the fiber ducts laid in concrete would prevent electrolysis, an evil commonly encountered with the use of a parkway cable. Again, there would be no danger of cutting the cable during trench excavation work for tapping water or gas-mains in the street. Another factor was that a burned-out cable in a duct system can be very readily removed and replaced,

whereas a parkway cable failure is difficult to locate, and would have to be dug up completely in order to be replaced. All these ducts were installed so that their tops were approximately 16 inches below the surface of the earth, to avoid any danger from the cables freezing. The entire conduit system was constructed of fiber ducts with ¼-inch walls.

The duct lines were designed for various types of handholes and manholes, each built to fill a special need for its own type of post foundation. All of these manholes and handholes are at the elevation of the sidewalk. Where there is no sidewalk they were placed about 6 inches above the natural surface of the ground to provide for the time when sidewalks should be laid. They were installed in this manner to prevent surface water from running into the duct lines. All the duct lines drain into manholes at street intersections, where sewer connections are made.

The trenches were dug by hand, and the entire system was installed in the parkways 3 feet from the sidewalk in order to obviate much digging up of the pavement. Six months' time sufficed for the entire job, and there was no blocking of traffic, owing to the care taken to dig close to the sidewalk. These duct lines were planned and laid out as straight as possible in order to reduce to a minimum the primary circuit mileage. All indirect runs to lamps in odd locations were made on the secondary sides. The concrete used in the duct lines consisted of one part cement, three parts sand, and five parts crushed stone. The stone used in this concrete was crushed limestone, and was large enough to pass through a screen having ¾-inch round holes. Each section of concrete was poured alternately as each layer of fiber duct was placed. After all the concrete lines had been laid, the contractor was required to let them set for 24 hours before the earth was replaced. To insure care, the constructor was held responsible for damages to the sidewalk or pavement. The entire cost of laying the circuit system was $153.44 1.44. This brought the cost of a mile of circuit up to $2,575.24.

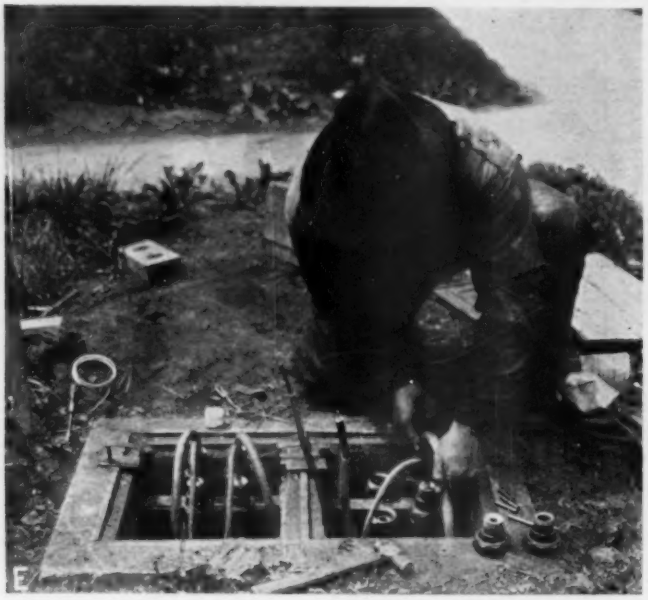
The main feeder cable from the manhole at First Avenue and Roosevelt Road, which brought the energy to the substation, was three-conductor No. O, B & S., rated at 12,000 volts. This cable has a 7/32-inch paper insulation over each conductor and 6/32-inch paper over both of them. The lead covering is 9/64-inches thick. While the primary operating lighting voltage is 4,000, both the primary and secondary conductors are of the same size—No. 6, B. & S. copper wire. The difference, however, lies in the thickness of insulation. In order to obtain some factor of safety, 5,000 volts was the tension chosen for this cable. The primary circuit has 6/32-inch insulation with 30 per cent Para rubber and tape insulation with a 5/64-inch protective lead covering. The secondary conductors from the transformers, running up through the middle of the pole to the lamps, are single-conductor, No. 6, B. & S. solid wire with 1/16-inch 30 per cent Para rubber-tape insulation covered with 1/16-inch lead covering. All the cables were required to withstand the factory test of two and one-half times the operating voltage between the conductor and the lead for a period of five minutes. After the cables were installed, they were tested to a value of twice the working voltage between the conductor and the lead for a period of five minutes, operating at a normal frequency of 60 cycles.

DETAILS OF POLE BASE TRANSFORMER INSTALLATION

No difficulty was encountered in the joining of these cables, as the standard methods normally employed by electrical utilities on such low-voltage installations were employed. However, care was taken to see that the temperature of the petrolatum was high enough when

pouring, in order to avoid the formation of air spaces in the joints.

This installation is one of the first to include a large number of transformers of the individual disconnecting type mounted in the base of the lamps themselves. These were furnished by the Kuhlman Electric Company of Bay City, Mich. They were chosen to permit ease in disconnecting the lamp from a primary circuit. Should there be trouble with a transformer or a test be desired, the primary connection plug can be pulled out and reinserted in a sleeve, and the main circuit will go on functioning. Three minutes will suffice for this. This connection plug and socket are self-centering, so that a perfect connection is always obtained. Because of the connecting sleeve, the transformer is always water-tight, thereby allowing the transformer to operate in the base of a post or when buried without any protection in the ground. This joint also obviates the need of wiping cable connections and of obtaining competent cable splicers to do this work. The lead cable is soldered to this connector, which can be handled by ordinary electricians. These transformers, together with the disconnecting sleeves, have withstood all water-submerged tests at 10,000 volts. By placing them in the base of the pole itself wherever possible, installation costs have been materially lowered as compared with apparatus requiring a complete underground manhole for each lamp. The transformers are of the standard 6.6-ampere, constant-series type, having a single conductor of No. 6, B. & S. rubber-insulated lead-covered cable. The primary circuit runs directly to the 250-c.p. tungsten lamp up through the center of the pole. The core and coils of the street transformer are installed in a welded galvanized-iron case which is so constructed as to be water-proof. The transformers were rated to withstand 20,000 volts, 60 cycles, for one minute between the primary and secondary windings. They have an operating efficiency under normal conditions of 92 per cent with a power factor of 98 per cent.



SOLDERING LEADS IN TRANSFORMERS

ACKNOWLEDGMENT.—Abstracted by permission from the August 9, 1924, issue of the *Electrical World*.

Chicago Plans an Underground Garage

IF plans under consideration by the Board of South Park Commissioners take shape, traffic conditions in Chicago will be alleviated within a reasonable length of time.

Several months ago the Chicago Board of Commerce presented a plan for an underground garage in Grant Park It was this plan which was O. K'd. at the last meeting of the Board, provided the legal, financial, and engineering details could be worked out successfully. Subcommittees of the Association's Street Traffic Committee are preparing definite plans touching these details.

At the meeting of the Board were representatives of State Street merchants in addition to men from the Association of Commerce. Pedestrians take their lives in their hands when they cross a street in Chicago, and if they come to the Loop in their own motor cars there is not sufficient space at a convenient distance for Loop shopping in which to park them. The situation is becoming acute.

The present plan incorporates the building of a series of underground units for housing cars. Each unit is expected to care for 306 cars. Each section of the unit, 25 x 60 feet, will store 6 cars. It is estimated that the average cost of construction will amount to $1,500 per car. If the structure at present under consideration is erected, there will be a one-story building whose top will be from 3 to 6 feet below the surface of the ground. Inclined roadways connecting with street intersections would be made for the coming of motors from ground level to the underground garage. The unit system is looked upon with favor, since it permits the work to go on as conditions make additional space necessary. By building as space is needed, no uselessly large expenditure is called for.

Motorization for Street Cleaning and Refuse Removal in Chicago

By William J. Galligan
Assistant Superintendent of Streets, Chicago, Ill.

THE need for motorization of the equipment of the Bureau of Streets of Chicago in street cleaning and refuse removal will be understood more readily if the city's size and mileage are fully realized. Chicago has a population of over 2,900,000; an area of 200 square miles, 20 miles in length, 10 miles in width. It has 2,300 miles of paved streets, 1,050 of unimproved; 450 miles of paved alleys, 1,350 of unimproved; a total of 5,150 miles of streets and alleys. It has 1,350 miles of street railways, with a daily passenger traffic of over 3,050,000.

SOUTH BEND FLUSHER UNIT USED IN CHICAGO

In common with that of other cities, Chicago's street-cleaning problem has greatly changed during the past 24 years. In 1911 the city's License Bureau showed 73,226 horses and 13,944 motor vehicles, as against 26,321 horses and 296,441 motor vehicles at the present time. It is not, therefore, so much a problem of the removal of heavy dirt as of an opportunity for cleaning the streets at all. Much time and intense study are given to the regulation of automobile traffic. Stringent ordinances and laws are passed in an attempt to safeguard human life, facilitate travel, and promote the interests of the business public.

As automobile traffic increases, street cleaning in like ratio becomes more difficult and increasingly greater in cost. Seventy-five per cent of street dirt on the pavement finds its way to the gutters within a few hours. The demand for clean streets and the removal of snow constantly grows more insistent, but with all the thought and care given to traffic regulation no account has been taken of the increased difficulty of street cleaning. If this branch of service is to continue to function, regulations must be made to furnish it with the opportunity.

The motorization here presented includes flushers and sweepers, truck-tractors, trailers and crawler-tractors, snow-plows and loaders.

Flushers

Flushers are used to supplement the work of the cleaning forces by washing the dust and fine dirt from the pavements. The down-town or "Loop" streets and those of the congested districts are flushed nightly. The main thoroughfares, business and traffic residential streets are flushed tri-weekly, others less frequently.

The city has twenty-eight 5-ton flushers of 1,500 gallons capacity; twenty Super trucks with South Bend double units, ten bought in 1922 at $7,500 each, and ten in 1923 at $6,955 each; seven Mack trucks equipped with Hvass single flushing units, purchased at a cost of $9,000 each; and one Packard with South Bend double unit, $7,580. The life of the flusher is estimated at 100,000 miles, and is discounted from year to year on a basis of mileage traveled.

Twenty-six of the flushers are operated in double shifts of 8 hours each, between 12:30 P. M. and 6:30 A. M. The remaining two are held in reserve to replace any that may be temporarily out of commission. Fifty-two crews of chauffeur and helper each are required to man the twenty-six flushers in daily use. Chauffeurs receive $7.50 per 8-hour shift, helpers $6. These twenty-six flushers travel 1,104 lineal miles and flush 11,925,296 square yards daily.

The Mack single unit averages 18 lineal miles per shift, consuming 2 quarts of oil at 12 cents per quart and 12 gallons of gasoline at 15¼ cents per gallon, making a cost of $2.07 for oil and gasoline. The Packard and Super double unit average 22 lineal miles per shift, consuming 2 quarts of oil at 12 cents per quart and 15 gallons of gasoline at 15¼ cents per gallon, making a cost of $2.53 for oil and gasoline. All models operate with 40 pounds pressure on the stream. For the year 1923 the cost of operation of the Mack single unit, including oil, gasoline, grease, shop, labor, parts, tires, depreciation, chauffeurs and helpers, averaged $1.17 per lineal mile; that of the Packard and Super double unit, 88 cents per lineal mile. The cost per 1,000 square yards was 8 2/5 cents.

It has been ascertained through observation and accurately kept records that the double unit not only gives better results in operation because of ability to control the stream regardless of the speed of the truck, but is to be preferred because of its economy. The double unit flushes, on an average, 4 more lineal miles of pavement to a shift than the single, with only 3 more gallons of gasoline and using 30 tanks of water, as against 28 with the single. The single unit runs on second speed when flushing; the double unit on high speed.

On car-line streets of 50-foot width or less, one trip is on each half of the street. On the first, which includes the center between the innermost car tracks, three nozzles are used on the single-unit type and two on that of the double. On the return trip two nozzles are used on both models. On residential streets the full width of the pavement is flushed in one operation.

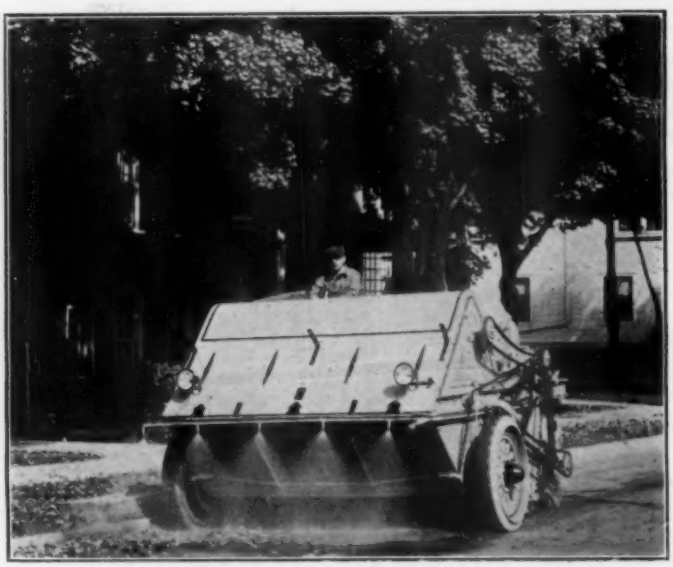
On the flushers of the single unit the four nozzles are trained to the right of the direction traveled, good results not being obtained otherwise. The nozzles on the double unit are arranged to flush on either side of the street or both sides in one operation.

If the present plan is carried out, twenty-two flushers will be added during the coming two years, making fifty in all. This number will be sufficient to care for the city's needs in this respect.

Sweepers

Chicago has eleven Elgin motor sweepers. Ten are used daily and one is kept in reserve for emergency. They are used for the most part in the outlying wards, where they are less liable to be handicapped by the parking of automobiles. The machines spray, clean the gutter, sweep the street, and pick up the dirt in a single operation. They average 5 hopper loads of dirt of 2¾ cubic yards each, consuming 10 gallons of gasoline and 2 quarts of oil in an 8-hour shift. The machine has a speed of 6 miles per hour. The rotary broom has two speeds. For heavy work the machine is operated in second speed and the broom in fast with a maximum flow of water. For light sweeping the machine is operated in high speed and the broom in slow.

Due to our immigration laws, which restrict the class of labor that sought and was adapted for this service, there has resulted a growing scarcity of good, available men and a greatly increased rate of wage. Realizing, therefore, that cities would be forced to seek other and more efficient methods, Chicago has adopted mechanical equipment for street cleaning.



AN ELGIN STREET SWEEPER USED IN CHICAGO

Tractors and Trailers

The motorization of Chicago's refuse collection equipment was begun in 1922. During the preceding years, the inadequacy of the city's method of collection in dilapidated wagons, the excessive cost of refuse removal by hired trucks, the increasing length of haul to dumps, and the advancing cost of operation led the City Coun-

cil and Street Bureau officials to seek an improved system. They investigated the use of the tractor and trailer system in other cities and were convinced that this would give satisfactory service at less expense. They therefore made appropriation for partial installation of this system. As these vehicles were for an entirely different activity from that of those previously used, the Council departed from its established policy of standardization and authorized the purchase of one 5-ton truck from each of the following companies:

WARNER SIDE-DUMPING TRAILERS USED FOR RUBBISH COLLECTION

Kelly Springfield Motor Truck Company	$4,414.60
Illinois Auto Truck Company (Super)	4,800.00
Packard Truck Company	4,836.70
International Harvester Company	5,092.00
Garford Motor Truck Company	5,307.00
The White Company	5,768.39
The H. Paulman & Company (Pierce Arrow)	5,913.83
International Motor Company (Mack)	6,224.73
	$42,357.25

In this way the city would be afforded opportunity for experimenting and deciding which tractor-truck was adapted to its needs.

Likewise, in the selection of trailers several types were chosen, as follows:

6 Detroit (knuckle type) reversible trailers @ $1,549.00 each	$9,294.00
12 Troy (knuckle type) reversible trailers @ $1,745.00 each	20,940.00
21 Highway (knuckle type) reversible trailers @ $1,595.00 each	33,495.00
6 Trailmobile (knuckle type) reversible trailers 3 @ $1,238; 3 @ $1,438	8,028.00
18 Warner (wagon type) non-reversible trailers @ $1,617.50 each	29,115.00
6 Automotive (wagon type) non-reversible trailers @ $1,450.00 each	8,700.00
12 Hvass (wagon type) non-reversible trailers @ $1,725.00 each	20,700.00
	$130,272.00

Since the installation of the trial trailers purchased during the summer of 1922, foremen of the dumps, superintendents of collection and equipment, engineers and officials of the Bureau, have made careful investigation of their operation and efficiency as contrasted with the old method of team and motor-truck haul. Reports from all are favorable to the tractor and trailer system. Their investigations have convinced them that two types of trailers are adapted to Chicago's needs, namely, Highway Trailer Company's and Albright & Company's Warner, 5th-wheel, non-reversible, 4-yard water-level. These trailers travel straight in train, are sufficiently light, yet strong and durable in collection of refuse in unpaved alleys, stand the severe test of soft, wet dumps, and seldom need repair. In accord with this finding, 80 of the Highway at $1,595 each and 79 of the Warner at $1,535 each were purchased at a cost of $248,865.

As no appropriation was made for the purchase of tractor trucks and the city was hiring trucks at the rate of $32.50 per day, the International Motor Company proposed furnishing them on a rental plan, and stated when an amount equal to the cost price of the truck had been paid, the equipment would become the property of the city of Chicago.

This plan was accepted and 25 Mack trucks were placed in service in August, 1924, to be paid for on the deferred payment plan of $400 per month for each truck, payments to be continued until $6,100 per truck is reached. A contract for 25 additional trucks was recently given to the White Company, the lowest responsible bidder.

The initial installation of the tractor and trailer system was made in six of the fifty wards into which the city is divided, one on the south side, two on the west, and three on the north. Four of the wards were selected because their respective ash and refuse teams were able to make but one load a day, the dumps available for disposal being from 8 to 9 miles distant. This made the cost of collection almost prohibitive. In the case of two wards chosen for experimental purposes on short hauls, the distances to their respective dumps were 3 and 5 miles.

There are in the six wards, eight tractors and trailer units, one tractor and three trailers in active operation, forming a unit or train. To each unit there are three, and in certain wards six, trailers in reserve in order that col-

lection may not be interrupted while tractor and train are in transition.

The tractor-trailer trains make from five to six trips daily on the 3-mile haul, four trips on the 5-mile, and three on the 8- or 9-mile haul, traveling in the last instance a total mileage of from 48 to 54 miles daily. The tractor picks up the trailers from their collection districts or from a central point to which the trailers have been brought for that purpose. Where conditions permit, the tractor hauls the trailers into the dump, but where this is impossible, by reason of a bog-like condition, Caterpillars bring them in. The tractors are manned by a chauffeur and a conductor or helper. The trailers are horse-drawn, manned by a driver and a helper and operated in specific districts. Three to five loads are collected daily. The trailers have a water-level capacity of 4½ cubic yards. The loads are heaped and receive a credit of 6 cubic yards at the dump. The engineers state that they carry more nearly 7 than 6 cubic yards.

While a statement showing standardized cost of operation, maintenance and repairs cannot yet be made, it can be reliably stated that the unit cost of collection and disposal is materially lower than by any other method employed to date in Chicago.

Based upon the test of the past year with 8 tractors and 81 trailers, the city officials and engineers estimate that 142 tractors and 1,020 trailers are needed to cover the area within the city limits. The cost of these vehicles is placed at $2,342,000. Supplementing them, the city would still employ 452 teams to collect from the unimproved alleys of the city. With that equipment, it is estimated that a large saving would be effected. As previously stated, the city is purchasing 25 tractors and 159 trailers, and it is desired to install the complete service.

Last year the collection of ashes and refuse cost $2,570,190 and the hauling of garbage $638,123—a total of $3,208,313. It is estimated that the same service in quantity, but considerably better in character, could have been rendered by the tractors and trailers for $2,490,810, thereby effecting a saving of $717,503. From this estimated annual saving of $717,503 alone, all the tractors and trailers required could be paid for in about three years.

Crawler Tractors

The use of the crawler tractors on the city dumps began in an experimental way. An appliance unique to Chicago, termed a "bulldozer," had been used in pushing ashes and refuse over the edge of the abandoned stone quarries and reclaiming land along the lake front. The appliance was in the nature of a road scraper projected at the end of a long pole and balanced on a two-wheel axle. A team was hooked to the whippletree and when driven pushed the refuse in front of the scraper into the fill.

The crawler tractors were tried in place of the horses; first, a 2½-ton tractor, then a 5-ton and later a 10-ton machine. It was found to be necessary frequently to pull mired loaded trucks out of the mud, requiring additional reserve power. The 10-ton crawler tractor was found to meet all requirements, and was adopted as standard. The crawler tractors are also used in pulling trailer trains into dumps when roadways are soft and wet. The city now has one 2½-ton Cleveland, five 5-ton and three 10-ton Holt Caterpillar tractors. The 10-ton Caterpillar tractors consume 23 gallons of gasoline and 4 quarts of oil each in an 8-hour shift.

Snow Removal

The territory covered in snow removal comprises the congested down-town business region or "Loop"; the wholesale, warehouse, market and commission house districts; the railway terminals; and the main arteries and car-line streets leading to the "Loop." It includes also the principal streets of practically all the business centers of the fifty wards into which the city is divided. Along the street railways of the city where the snow is not cleared from the pavements, it is removed to the extent of 50 feet where passengers get on and off, and from the entire intersection at prominent transfer points. Attention is also given to the removal of snow from in front of churches, schools and buildings generally where persons gather in large numbers. Newspapers are scanned for burial notices so that snow may be removed from places where funerals will take place.

Since the winter of 1918, which in snowfall and severity broke all records for the Chicago region during the existence of the Weather Bureau, the fall of snow has been greatly below normal. The depth of fall for the winter of 1923-24 was 26.9 inches.

The mechanical equipment used in snow removal comprises plows, trucks and loaders. The snow is disposed of along the river front, in large sewers and vacant lots.

The Bureau of Streets has 25 snow-plows of the Champion and Baker makes. These are attached to the front of its street flushers.

They are started when the snow has reached a depth of about 1½ inches and are operated continuously thereafter until the streets included in the schedule are cleared. This places the snow in windrows ready for removal during and after the cessation of the storm. On many through-streets the environment of which does not require the removal of the snow, the plows clear the pavements for traffic. They are operated in batteries of two and travel at two speeds, from 4 to 6 miles per hour.

A TYPE OF SNOW-PLOW USED WITH HOLT TRACTORS IN CHICAGO

The snow is removed by trucks hired from contractors and firms at the rate of $32.50 per day of 8 hours. The trucks are loaded by hand, by the Barber-Greene snow loaders, and by clam-shell derricks mounted on trucks. Only once during the last winter was there sufficient snow to make the use of the loaders practicable, and as this snow fell during a mild temperature, making it nearly slush, followed by a zero drop, it did not furnish a favorable condition for their operation. In December, 1920, Chicago made an initial test of the Barber-Greene snow loader. It ran 32 hours continuously without a breakdown. It averaged more than 3 cubic yards per minute, although the snow had not been plowed or piled. In its operation a loader requires the services of an engineer and a helper, and two laborers at the plow end. It is self-propelled, self-loading, and end-discharging. It has a plow on either side of the conveyor belt, gathers the snow from the pavement and places it on the conveyor, which loads it onto a truck moving in the rear of the loader. It is operated by a Buda gas engine which consumes less than 12 gallons of gasoline and about 1 quart of oil in an 8-hour shift. The city has four of these, bought at a cost of $4,900 each.

The clam-shell derricks proved of value during the past winter, loading an 8-yard truck in about 3 minutes. They are operated by a separate motor from that of the truck. Six of these were employed, being hired from a contractor at the rate of $5 per hour.

The congestion of the streets is a great hindrance to the use of mechanical loaders, the hours from midnight to early morning being the only time when they are comparatively free from traffic and parkings. As these are the hours when it is practically impossible to secure labor and yet when conditions are most favorable for removal, the loaders have exceptional value. Under favorable conditions there is great economy in the use of mechanical loaders over that of laborers with scoops.

Extent and Cost of Snow Removal

During the period from January to the end of March, 1924, 55,889,487 square yards of pavement were cleared, 311,969 cubic yards of snow being removed. The cost of removal, including labor and motor vehicles, was $306,-724; the cost of cartage being 34.4 cents per cubic yard.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements, at Boston, Mass.

New White Way in Abilene, Texas

SEVEN miles of streets in Abilene, Texas, a town of 15,000 inhabitants, have been equipped with a new modern street-lighting system, using ornamental standards. The West Texas Utilities Company, which furnishes power to Abilene, made the installation. There are 483 single-light standards and a few bracket types for special places. In the business district, the Union Metal poles mounted on concrete subbases are placed six to the block, opposite each other. In the residential section, there are three to the block, in staggered formation. The lighting units are G. E. Novalux fixtures with rippled alabaster globes and rippled canopies.

Civic Changes and Growth Demand That Local Transportation Keep Pace

By John A. Beeler

Director, The Beeler Organization, Public Utility Consultants, New York City

DURING the development of any growing community, civic changes occur from time to time that have a material effect on the local transportation system. These changes may result from municipal or industrial activities or from other causes. The traveling habits of the population are changing, and traveling facilities must be revised to accommodate them. Among other things, a traffic survey is essential to determine the proper type or types of coordinated local transportation and to specify the routing, quantity, quality, and type of service required to best serve the community. It is now generally recognized that local transportation, efficiently and economically rendered, is most essential to the social and commercial welfare of any first-class community.

REROUTING AND OPERATING SURVEY OF TRACTION SYSTEM SERVING 200,000 POPULATION

Revenues and Expenses	Old Plan (Actual)	Revised Plan (Estimated)
Operating revenue	$2,670,400	$2,670,400
Operating deductions	2,179,000	1,927,000
Net revenue	491,400	743,400
OPERATING COMPARISONS		
Miles of track operated	83.8	83.8
Number of cars in service	195	172
Car-hours	910,500	735,000
Car-miles	7,500,000	6,420,000
Car-miles per car-hour	8.22	8.74
Operating revenue per mile of track	$31,900	$31,900
Operating revenue per car-hour	$2.94	$3.64
Operating deductions per car-hour	$2.39	$2.62
Net revenue per car-hour	$0.55	$1.02
Operating revenue per car-mile, cents	35.6	41.6
Operating deductions per car-mile, cents	29.0	30.0
Net revenue per car-mile, cents	6.6	11.6

Population Centers Shifting

Population centers are shifting. New sections may rapidly outstrip older ones. Business centers are moving in many cities. Take New York, for instance, where the principal retail section has been steadily climbing uptown. A few years ago it was at 14th Street; then 23rd Street; then 34th Street; now 42nd Street, and pressing on towards 57th Street. Chicago has at last broken through the iron-bound Loop and is fast flowing northward along the new Michigan Boulevard. Similarly, in many other cities the movement of the principal business section is apparent.

New secondary business districts are developing in the more important cities. Apartment house construction is concentrating the population. Industrial developments, viaducts, bridges, tunnels, and boulevards are opening up and making available new districts. Enterprising realtors and progressive populations are creating new developments in many enterprising cities. The relocation of steam railroad terminals and stations and the construction of rapid transit lines all have a far-reaching effect on city development and its local transportation.

There are numerous instances where the principal railway station has been moved from the heart of the down-town district to an outlying district, with a great effect on the development of the city. A few years ago in a city of less than 200,000, the railway terminal was moved from the business district to a point two miles distant in a comparatively undeveloped section, creating much new development and new demands on the local street railway.

In other cities the electrification of steam railroad lines has caused important shifts in the population and great changes in the character of the adjacent residential and business sections. In the larger cities the construction of rapid transit subway and elevated lines has completely revolutionized former conditions. A subway, with express and local service, concentrates and develops new residential and business sections along its path. The surface lines, formerly serving the same districts, quickly undergo a transformation and, contrary to the expectations of many, after suffering a temporary slump, develop a new business.

The function of the rapid transit lines is primarily to move mass transportation quickly, and usually for considerable distances. The

surface lines may lose the long-haul patrons, but in many instances they take care of an increased and more profitable short-haul traffic. For instance, in Manhattan when the four-track subway was constructed on Broadway north of 42nd Street, the surface cars operating on this thoroughfare suffered a diminution of travel temporarily, but to-day this line is one of the best in the city, showing earnings around one dollar per car-mile.

The construction of rapid-transit tunnels under the rivers around Manhattan has caused tremendous shifting on the adjacent shores from the old traffic channels to the new. This is illustrated by the fact that most of the business formerly done by surface cars in hauling immense crowds to the ferry lines has disappeared. There are as yet a few car lines operating heavy service to superseded terminals, while busses, in some cases paralleling the car lines in the main, are routed to the rapid transit terminals, much to the advantage of the bus.

Industrial development is usually a slow and steady growth. There are, however, a number of examples of excessively rapid development. The Ford plant is perhaps the most notable example of a score or more in Detroit. In Chicago, the Western Electric plant may be cited as an example of a considerable number of large industrial enterprises employing thousands of workers which have created problems for the local transportation system. The removal of the Baldwin Locomotive plant from the heart of Philadelphia to the suburbs is another example. A railway serving large industrials faces a huge and intricate problem in arranging service that will meet the demands satisfactorily and keep within the prescribed limit of costs. Unbalanced loading results either in non-productive or in inadequate service, either of which is a detriment to the company and the community.

Necessity of City Plan with Coordination of Transit and Traffic

Municipal improvements, such as the establishment of civic centers, parks, boulevards, viaducts, and transportation arteries under a comprehensive plan, may be used to shift or diffuse concentrated traffic, both public and private, from certain congested districts to thoroughfares where freer movements may be obtained. Hence the absolute necessity of providing for a comprehensive system of coordinated local transportation in any effectual city plan. The unprecedented increase in the use of the automobile in the past decade, while greatly stimulating the riding habit as a whole, brings new problems to the fore, such as fast vehicular ways by-passing this class of traffic around the congested district as far as practicable instead of through it.

In a community of less than 300,000, traffic checks showed that 330 street cars and 27,000 private automobiles were in active daily use last year. The passenger rides were 75,000,000 on the railway and 55,000,000 by automobile, making a total annually of 130,000,000 rides. From this it is seen that it required 80 times as many automobiles to care for but two-thirds as many riders as carried by the railway. This illustrates forcibly the absolute necessity of maintaining the local railway system in the highest possible state of efficiency, for, as it deteriorates, the growth of the private automobile is stimulated. This motor growth is now involving many cities throughout the country in street-opening and widening projects that are costing millions upon millions of dollars. Many such improvements are promptly usurped by the parking hog, thus largely neutralizing the benefits before they are obtained.

Not only does the street car conserve space in the moving lanes of massed traffic, but it requires no parking space. Cities must encourage and foster local transportation systems for the benefit of the community and to avoid excessive taxation. The crying need everywhere is for better public transportation. The cities to-day that are securing superior service are those that are the most prosperous and progressive.

Tractions must not be taxed to death, nor must special burdens be heaped upon them, as has been the tendency in the past. The elimination of such burdens will assist in keeping the fares at a minimum. The rates, however, must be sufficient to renew and perpetuate the equipment and plant, and maintain an up-to-date system. It is not the rate of fare that is most objectionable, but inferior service, which is dear at any price.

Developing Near-by Versus Outlying Districts

In a city of some 400,000 the fact was developed by analysis that a territory equaling one-quarter of the city's area, and housing one-half of the population, contained two-thirds of the car tracks, and that a newer district, housing the other half of the population and covering three-quarters of the city's territory, had but one-third of the trackage. Under these conditions the trolley service was neither satisfactory to the public nor profitable to the com-

pany. In order to correct this inequality and permit of the proper expansion of the community, a comprehensive rearrangement of the trackage, together with a radical change in the routing, was recommended.

On the other hand, too many cities have complacently allowed themselves to be over-expanded by enterprising realtors and others anxious to locate homes in outlying sections. This involves, in addition to car-line extensions, the expansion of the gas and water services as well as the sewer and paving systems of the community. It increases the costs of police, school, and all other city departments. Meantime, much close-in property stands vacant, representing practically a dead loss to the community.

Rehabilitating Non-Paying Traction Without Increasing the Fare

Recently an enterprising railway management in a western city made a survey of the vacant residence sites within easy walking distance of its car lines. It was ascertained that 24,000 such sites existed. It listed the properties by localities and inaugurated an energetic publicity campaign, using car, newspaper, and bill-board advertising. With the cooperation of the lot owners, the real estate men and the authorities, a demand was created for these properties and a building boom started. This enabled the railway to stimulate its more profitable short-haul business and reduce the pressure from those interested in outside developments, involving more non-paying lines. It also forcibly pointed out to the community the advantages of building up these inside districts before further expansion.

The desirability of bettering the present transportation methods and at the same time providing a comprehensive plan for future requirements by coordinating all the essential elements of public transit is now recognized more generally than ever before; in fact, any important community's commercial and industrial future depends largely upon good local transportation, both public and private. This need is the one big problem facing our larger cities to-day—and it is by no means confined exclusively to the big cities.

An example of the benefits of a survey in a community of 200,000 people is shown briefly by the comparison of a few essential operating figures on page 568. In this case the revised plan that was submitted and adopted, among other things, provided for more direct routing of the car lines, the elimination of duplication in service, and the distribution of the service more nearly in accordance with the indicated travel requirements. By minimizing delays and by relieving and avoiding congestion, the average speed of the cars was increased about 8 per cent, which is strictly in line with the best practice to-day. The revised plan also showed it to be practicable to increase the annual net earnings from $491,400 to $743,000. The latter figure capitalized at 7 per cent is $10,600,000; the former, $7,000,000. The difference, or $3,600,000, represents the financial value to the community in operating under the revised plan, for the public pays the cost in the end. At the same time, an improved service was given to the patrons and the railway made self-sustaining without an increase in the rate of fare.

An All-Community Problem—Racial Groups and Public Health

FROM various sections of the country come indications of greater community appreciation of the mutual dependence of racial groups on each other for better health. There is a growing realization of the fact that communicable diseases and epidemics do not draw color or race lines. Progressive public-health workers long ago recognized that if a community is to be adequately protected, a focus of disease must be eliminated, no matter which race harbors it. However, there still remains much to be done in developing this attitude toward the health of races in a community and also much to be done for the further reduction of morbidity and mortality rates among Negroes. At the present time the venereal diseases, tuberculosis, and various infantile disorders are still reaping a heavy toll among the colored people, and the influence on these conditions is bound to be felt more and more in the North as a result of the steady Negro migration from southern sections. The public-health problems of those northern industrial communities which are receiving the bulk of this migration, cannot avoid being complicated through this influence, particularly as students of the race problem predict that the migration is likely to continue for a long time.

With increased Negro populations and the attendant health problems, it is essential that the northern centers most affected by this influx should give increased study to the situation. It is important that these communities understand their problems sufficiently to advise ways and means by which existing agencies for the promotion of public health and social welfare may appreciate and meet them. Experiences in several communities show that good results may be secured by the development and the use of Negro personnel, this personnel to be given the advantage of working in those organizations already established for the handling of those conditions.

—From the October, 1924, issue of the *Journal of Social Hygiene*.

General Organization of City Paving Departments

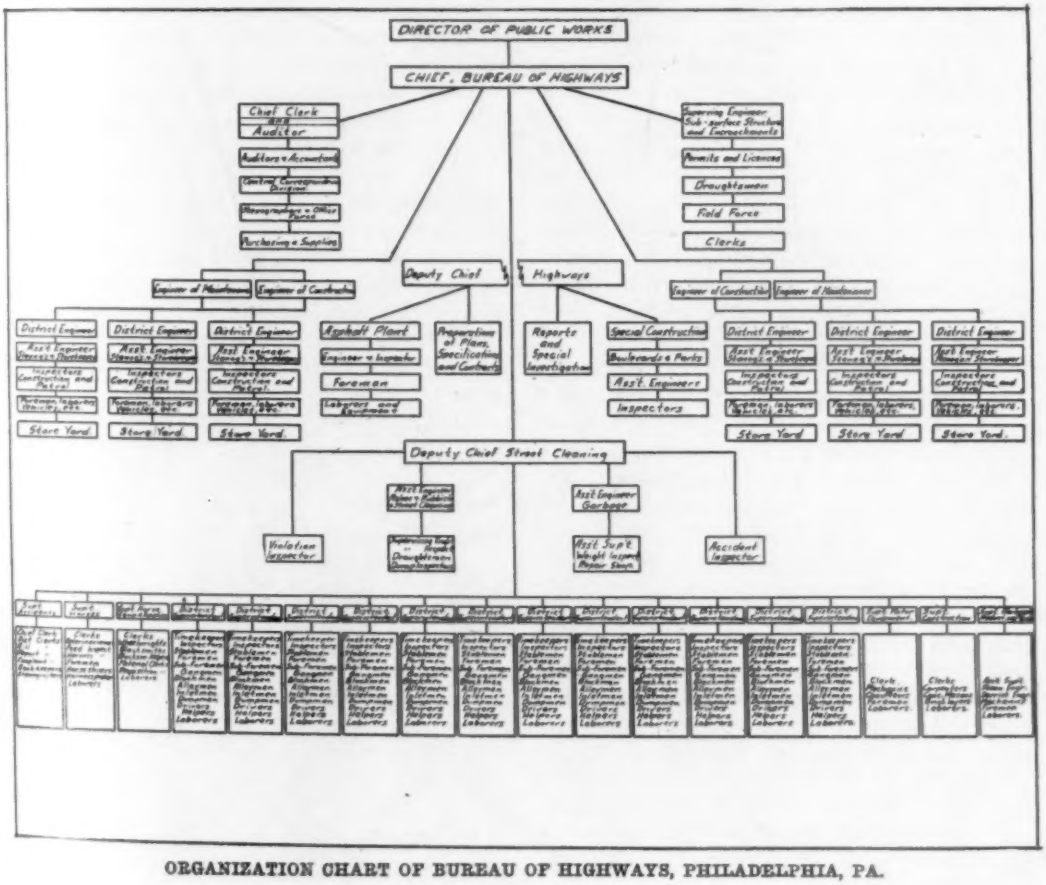
Abstract of Report of Conference Held at the Engineers' Club of Philadelphia

PHILADELPHIA, PA.

By J. H. Neeson, Chief, Bureau of Highways

THE highway organization in Philadelphia is divided into two functions—one of construction, and one of street cleaning. It is the largest metropolitan city that has an organization of this character. This came about, originally, owing to the fact that street cleaning and the collection and disposal of waste has been considered by engineers to be a function of street maintenance. Whether it is or not is a debatable question. With proper control, there would probably be little difficulty in handling it. As a part of a big system, as it has been in Philadelphia up to two or three years ago, it simply meant supervision, the supervision being supplied by the highway engineers and the inspectors under them—their only duty being to see that specifications were carried out in accordance with contract. But when the change was made from contract work to municipal work, it became a different proposition, because then the department was directly handling an organization of its own, involving about 3,000 men.

Considered from that standpoint, a division of street cleaning may become unwieldy and unmanageable; and, in connection with the functioning of the highway department there may be ground for contention as to whether it should properly be included. There are, however, other reasons why, from an engineering standpoint, we should consider street cleaning as a function of highways. There are certain related costs, certain related engineering reasons, why street cleaning should be



ORGANIZATION CHART OF BUREAU OF HIGHWAYS, PHILADELPHIA, PA.

considered a part of the maintenance of highways; but it is a question of such magnitude that it resolves itself into one of policy.

The highway unit has charge of the construction and maintenance of all city street paving and country roads; of boulevards and parkways; the maintenance of bridges, sewers and watercourses; the supervision of all matters affecting the use of public highways between building lines, and such incidental work as erection of buildings and development of city property areas as may be directed by special legislation.

The street cleaning unit now has direct charge of the operation of cleaning streets, including the removal of snow; the collection and disposal of ashes, rubbish and garbage by municipal forces; the construction and maintenance of buildings (stables, reduction and incinerator plants, garages and shops), plant and equipment.

The control of the combined units is vested in the Chief of the Bureau of Highways. The personnel of the Highways Division consists of 700 to 800 employees, comprising engineers of construction and maintenance; division and district engineers, assistant engineers, inspectors; street, road, bridge and sewer maintenance units; and the accounting and clerical forces. The Street Cleaning Division has on its roll 2,800 to 3,000 persons—assistant and supervising engineers, district superintendents, veterinarians, superintendents of plant and equipment, inspectors, accountants, timekeepers and clerks, and the force necessary for the daily collection and disposal of ashes, rubbish and garbage and the cleaning of streets. Each division is in direct charge of a deputy chief.

The Highway Division is responsible for maintaining and keeping in good repair over 1,600 miles of improved streets and road pavements, 1,100 miles of sewers, and 275 bridge structures; constructs new streets and roads (including grading and paving); repaves and resurfaces; constructs boulevards and parks; executes five hundred contracts annually and has control of the expenditure of approximately $7,500,000 of current and loan funds. The Street Cleaning Division cleans on definite schedules the above mileage of streets and roads; serves two million people in the collection and disposal of waste; operates a garage and a reduction plant; constructs new plants and equipment; provides for the up-keep of garages, stables and shops; maintains 1,800 horses, 800 pieces of horse-drawn equipment, and 125 pieces of motorized equipment, at a total annual outlay of current and loan funds of approximately $5,500,000.

The combined cash expenditures of the Highways and Street Cleaning Division range from $13,000,000 to $15,000,000 annually.

The organization of the Highway Division for construction and maintenance of streets and roads has been established for several years. It has never been found necessary to modify the method of its functioning, except for slight changes in procedure, since it was originally designed for strictly highway purposes. It is fundamentally sound in conception, being built to fit the geographical conditions of the city as well as to supply the proper amount of engineering supervision and control. It is sufficiently flexible to permit of such expansion as would be necessary to take care of a comprehensive program of construction work—mainly additional engineering and inspection service.

Construction practices, being standardized, are carried on in the subdivisions or districts under the direction of the Engineer of Construction, a similar procedure being followed on maintenance work of streets and roads under the Engineer of Maintenance, both of whom report direct to the Chief Engineer. The organization functions in such a manner that the Chief of the Bureau may engage himself with important administrative details while exercising control of the entire organization through his principal subordinates.

There has been a slight modification since its original conception, in that when the Highway Bureau was first organized on an engineering basis, twelve years ago, the functions of construction and maintenance were equally divided between two division engineers, the division engineers having charge of an allotted number of districts, the work being approximately equally divided between the two.

Changes made a few years later, probably six years ago, resulted in a modification of the organization to the extent of putting one engineer exclusively in charge of construction work over the entire city, and another engineer in charge of the maintenance work over the entire city. That is the principal change that has been made, but it also has resulted in a number of modifications and changes from the original, which are more or less automatic. By dividing the work between two division engineers, their various functions could be properly coordinated, but when that work was taken away and an engineer of construction and an engineer of maintenance instituted, it upset, to some extent, the original plan, and we have been operating under that latter plan for

about six years. From an organization and an engineering standpoint, in my mind, the original plan was the better of the two; but we haven't reached the point yet where we are quite ready to return to it.

Our highway work is placed in charge of six district engineers, whose duties are to assume charge of the construction of new streets and roads and the maintenance of streets and roads. Under them are the various inspectors of construction and of maintenance. Each district engineering force acts as an individual unit, all coming directly under the Deputy Chief of the Bureau, theoretically, and operating from the main office in their general work.

The question of organization of a highway department, considered simply as a highway department, is one that we should wish to standardize; that is, so far as the work of this particular organization in every large city in the United States is concerned. But difficulties about that arise from the fact that by legislation, and sometimes by executive enactment, functions which engineers believe should come under the highway organization are given over to other bureaus. To cite one instance—the designing of streets and roads is allotted to a bureau of another department.

Undoubtedly, it is desirable to combine all the functions entering into the construction of a street or of a road, in one organization. Design should originate in the highway organization, and construction be carried out by it; and maintenance should be, as it is, of course, in all organizations, an essential part of the work. The ideal highway organization is the one that carries the responsibility for design, construction and maintenance, and the authority thereafter over all portions of the street, from house line to house line. There is considerable lost motion involved in the placing of one important function under one bureau and two others equally important under another. They should all be combined and carried out as a part of one unit. The maintenance of city pavements is comparable in responsibility to the construction: the highway department should control the street from its original construction until its limit of life has been reached.

The methods in Philadelphia for locating repair work are practically the same as they are in other cities. It is a function of the district forces, through their inspectors and the district engineers, to so supervise their work, or investigate their work and investigate the conditions of the streets, that repairs will naturally show or assert themselves at once. The great difficulty is in keeping up with the actual amount of work that is to be done. In other words, the program is never caught up with. While theoretically the organization for conducting maintenance may be sound and would work out properly, it is restricted and limited to the actual conditions under which it has to work—labor conditions, material conditions and funds available. So that while the maintenance of streets is, from the public standpoint, more important than the actual construction, it is very difficult to keep them in such condition that the public will be thoroughly protected and thoroughly satisfied.

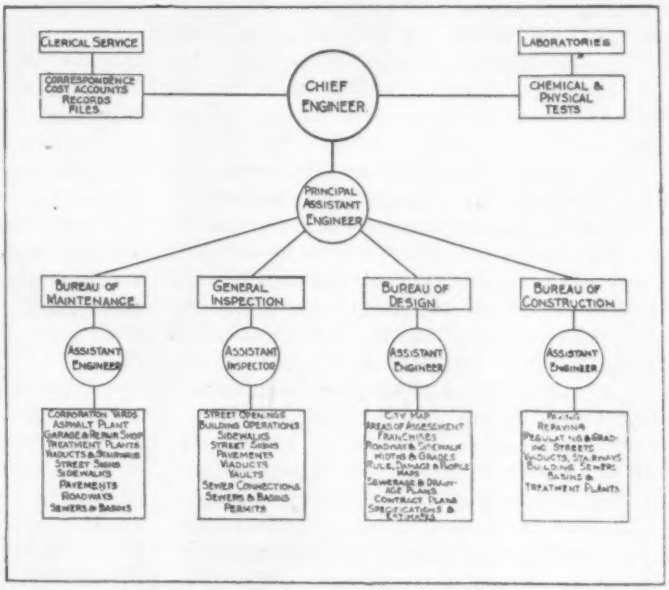


CHART OF ORGANIZATION OF PAVING DEPARTMENT OF THE BOROUGH OF MANHATTAN, NEW YORK

BOROUGH OF MANHATTAN, NEW YORK CITY

By C. M. Pinckney, Chief Engineer

THE Bureau of Engineering is responsible to the Commissioner of Public Works for the construction and maintenance of all streets, street pavements, roads, highways, tunnels, stairway streets, sewers and sewer appur-

tenances in the borough of Manhattan, New York City, except those within limits of public parks.

The bureau has four divisions; i.e., inspection, Design, Construction, and Maintenance. The executive head of the bureau is the Chief Engineer, who has a chief clerk and a testing laboratory reporting directly to him. Each of the four divisions has an assistant engineer in charge.

The Inspection Division maintains a patrol system of the streets and furnishes a complete detailed report of the condition of every street in the city, including pavements, sidewalks, drainage, cuts, and all other matters for which the bureau is responsible. In other words, the Division of Inspection is the "eyes" of the bureau. All permits for the opening of pavement, and occupation thereof by builders, also for vault space, are issued by this division upon information furnished by its patrol section.

The Design Division is the creative branch of the bureau. It is engaged in the making of the city plan and changes thereto, and in the drainage system of the borough, and prepares all contract plans and specifications for sewers, paving and repaving work, sidewalks, viaducts, etc., and plant and equipment of all kinds for use of the bureau.

The Construction Division executes the contract work designed by the Design Division.

The Maintenance Division repairs pavements and sewers, cleans sewers and basins, restores all cuts or disturbances in street pavements, supervises the making of sewer connections, and has the general care of all public work for which the bureau is responsible. The labor work in this division is done by skilled asphalt workers, mechanics, sewer cleaners, bricklayers, etc.

The asphalt pavements in the borough of Manhattan are laid with a five-year guarantee, and from the date of their final completion and acceptance are under the charge of the Maintenance Division. At the expiration of the guarantee period the maintenance is assumed by departmental forces, and the material required is furnished by our own asphalt plant, which has a capacity of 4,000 yards a day. This asphalt plant supplies material for seventeen asphalt gangs, and during the months of June, July, August, September and October, four of these gangs are assigned to resurfacing asphalt pavements by the use of the heater method.

All granite pavements are laid with a one-year guarantee, and at the expiration of the one year, the maintenance is taken over by the departmental forces, and repairs are effected by seventeen granite gangs, who also repair the wood block pavements in the borough.

The sewer maintenance forces are divided into three groups—basin cleaning, sewer cleaning, and sewer repair gangs. Some of the basin cleaning is done by machine, and some by hand.

The foundations of pavements are repaired by regularly organized concrete gangs.

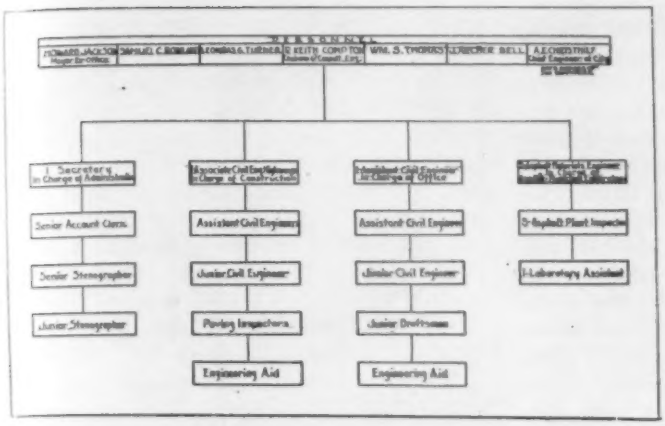
The engineer in charge of the Maintenance Division has reporting to him the superintendent of the asphalt plant, all general foremen in charge of a number of street gangs, the chief inspector representing the sewer activity, and the chief inspector representing the highway activity.

The testing laboratory is in charge of a chemist, and it is the function of that section to conduct all physical as well as chemical tests on all materials entering into the construction and maintenance of all public works under the care of the bureau. A representative of the laboratory is stationed at every place of manufacture, such as wood block treatment plants, asphalt plants and cement works, etc.

BALTIMORE, MD.

By George Cobb

In Baltimore there are three paving departments which function independently and at the same time cooperate rather closely. The first of these is the Paving Commission, created by act of the Maryland Legislature. It supervises the laying of new streets in the city. The second, the Maryland State Roads Commission, is authorized to expend from its yearly road allotment funds, 20 per cent on the paving of new streets in the city proper. The third, the Baltimore Highways Engineer Department, is responsible for the maintenance of all streets within the city limits. In each contract let under the Paving Commission, a clause provides that final acceptance of the work will not be made by the Commission until an inspection is made after an interval of six months, provided the expiration of the six months' period falls between May 1 and December 1. Otherwise the final inspection will be made immediately after May 1 succeeding the completion of the work. Upon acceptance of the work, the Paving Commission places it in the hands of the Highways Engineer for future maintenance. In the case of the Maryland State Roads Commission, work completed



ORGANIZATION CHART OF PAVING COMMISSION OF THE CITY OF BALTIMORE

under its supervision is immediately given a final inspection and then turned over to the Highways Engineer.

The Paving Commission operates under its chairman, who is also consulting engineer to the Commission. His principal assistant is an associate civil engineer, under whom a corps of assistant engineers supervise the contracts allotted to their several districts. Under each of these assistant engineers are inspectors and aides, who remain constantly on the sections of work in active operation. The drafting-room personnel, under an office engineer, reports directly to the chairman and consulting engineer. Likewise does the secretary to the Commission report direct to the chairman. Under the secretary come the clerical forces. The Commission operates a paving testing laboratory, in charge of an engineer, who also reports to the chairman direct. Under this engineer are asphalt plant inspectors—one located at the plant of each contractor in active operation—and laboratory assistants. The asphalt engineer is charged with the selection of proper materials and maintenance of correct mixtures. He makes daily trips to the operating plants and streets under construction and has analyses made of the materials and mixtures at each. The chairman maintains a system of daily reports whereby his street and plant forces render him an exact statement as to the yardage of paving laid and the total depth after compression. Once a week he holds a meeting, attended by all his engineers.

The head of the Maryland State Roads Commission is the chairman and chief engineer. He has an assistant chief engineer, who has under him division engineers, one of whom is assigned to each district in the state. The division engineers have their individual forces of inspectors and assistants. They supervise their work in its entirety, with the exception of sheet asphalt. When a state contract provides for the latter material, whether the work is to be done in the city of Baltimore, out of the yearly 20 per cent allotment of state paving funds, or anywhere in the state, the Paving Commission's laboratory is asked

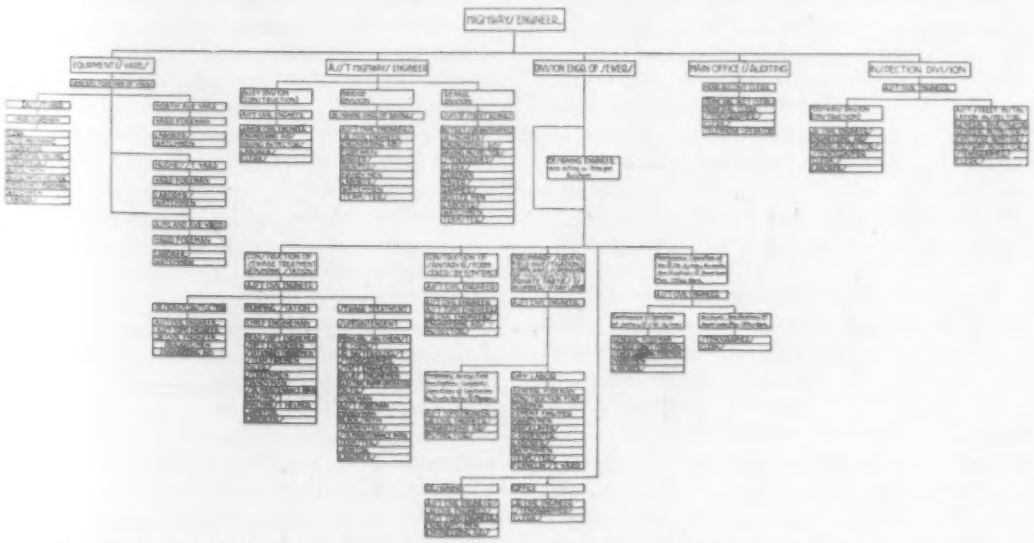


CHART OF ORGANIZATION OF THE OFFICE OF THE HIGHWAYS ENGINEER, BALTIMORE, MD.

to provide plant inspection. This arrangement, by mutual agreement of the State and Paving Commission chairman, has obtained for five years. For this service the State Commission pays at the end of the year to the Paving Commission a sum based on the prorated cost per square yard of all the paving inspected by the Paving Commission's laboratory during the year. In the selection of streets to be handled by the State Roads Commission, the Commission invariably follows the recommendation of the Paving Commission. The Paving Commission then lists these streets and acts as the intermediary between the State Roads Commission, city departments and public service corporations. When the utilities are completed, the release comes through the Paving Commission to the State Roads Commission, thus insuring close cooperation between the city and the state.

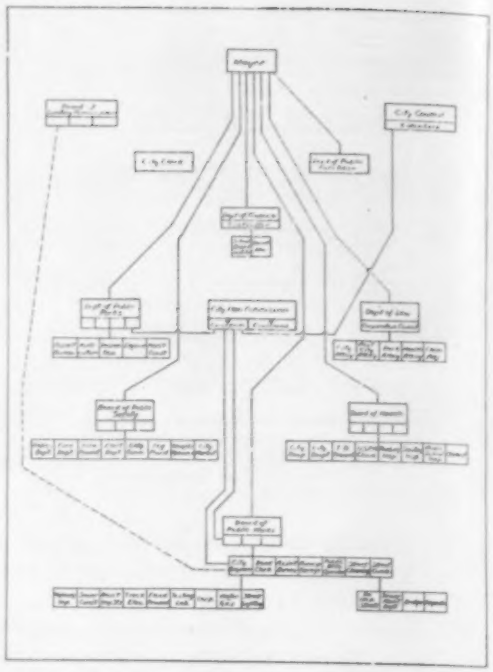
The Highways Engineer is in charge of the Highways Engineer Department. He has an Assistant Highways Engineer, who is directly over the superintendent of sheet asphalt repairs. This superintendent is in active charge of the paving inspection force. He assigns inspectors to the several paving zones into which the city has been divided. The zone inspector is held responsible for the proper laying of necessary repair work in his zone. A second assistant engineer, reporting to the Assistant Highways Engineer, is in charge of surface treatment work in the suburban areas. He directs his force of inspectors. As in the case of the State Roads Commission, the Highway Engineer calls upon the Paving Commission's laboratory for plant inspection and pays for the service.

Because of close cooperation, paving inspection costs are reduced to a minimum, each of the three paving departments benefiting proportionately. As an index to the efficiency of this system, it might be noted that in 1923 the amount of repair work relaid on bituminous streets in Baltimore, due to defective and worn-out paving, was 1.0 per cent. The paving involved covers four and a half million square yards, the oldest of which was laid in 1898.

INDIANAPOLLS, IND.

By J. L. Elliott, former City Civil Engineer

All street paving and maintenance is under the direction of the Board of Public Works, but under the direct supervision of the City Civil Engineer. The City Engineering Department prepares the necessary plans, specifications and resolutions for street paving, which are submitted to the Board of Public Works for hearing and contracts.



ORGANIZATION CHART OF THE ENGINEERING DEPARTMENT, INDIANAPOLIS, IND.

All construction work on new paving is done by contract under the direct supervision of the Inspection Department, which is a part of the City Engineering Department. The city of Indianapolis has its own maintenance department under the direction of the City Civil Engineer, which repairs and maintains all improved streets.

The Maintenance Department is under the General Superintendent, two assistant superintendents and necessary foremen, who are under the direct supervision of the City Engineer. During the summer months the city maintained two asphalt repair gangs, one emergency gang, two wood block and brick repair gangs, and one sidewalk and curb repair gang, each under a foreman experienced in the handling of the particular class of repairs.

The larger repair gangs cover the city from the repair yard to the city limits by gradual stages, making permanent repairs as they go. The emergency repair gang is used for emergency repairs which will not be reached by the repair gangs for a considerable length of time. The necessity for repairs is brought to the attention of the department by the Police Department and the Inspection Department. These requests are noted and necessary repairs scheduled by the Repair Department.

The city maintains an asphalt plant of approximately 1,200 yards capacity, with which all asphalt repairs are made. The brick and block repairs, to a great extent, are made by replacing worn brick and block with new construction. If the condition of the street is such that this replacement would cost more money than is justifiable, the street is then either resurfaced or patched with asphalt until resurfacing is accomplished.

WALTHAM, MASS.
By George C. Brehm
City Engineer and Director, D. P. W.

The engineering organization in Waltham, Mass., consists of a Department of Public Works, including streets, water, sewer, and engineering. All the city paving is done by our own forces, and we find it most satisfactory in every respect. The Street Division of the Public Works Department takes care of the construction and maintenance of streets and controls the street openings, etc., all of this work being handled by our own forces.

Practically all of our pavements are bituminous macadam, with a small amount of sheet asphalt. We have a gang constantly patrolling the streets, using the cold patch on the bituminous macadam streets for repairs, and the hot mix on the sheet asphalt streets.

American Counties Prevent the Blockading of Roads by Snow

Reports from Counties in the Snow Belt

FOR nearly ten years we have been talking of the need of snow removal on main highways to facilitate traffic 365 days a year. This need has been imperative with the increasing number of bus lines and of manufacturers who depend on highways for the distribution of their products. The reports from a score or more of counties throughout the United States, given below, show how completely reliance is now placed on automotive equipment for this kind of work. It must be remembered, however, that even the best automotive equipment is powerless to cope with a storm unless it begins to fight the storm the instant the snow begins to fall and unless it covers the ground frequently enough to prevent the drifting or packing of the snow.

Reports

Finney County, Kans.—Ben L. Allen, County Engineer, Garden City, Kans., reports that they are using Holt tractors and Baker V-type snow-plows to keep the highways open. In the winter of 1922-23 snow removal cost $1,365, and in 1923-24 it cost $1,158. The total snowfall in the latter winter was 14 inches, and the equipment was out seven days. Between 28 and 32 men were used in the snow-fighting forces.

Reno County, Kans.—W. A. Stacey, County Engineer, Hutchinson, Kans., reports that their mechanical equipment consists of two 10-ton Holt tractors, one 12-foot blade snow-plow, two 12-foot graders, and thirty 8-foot patrol graders. Six inches of snow fell in the winter of 1922-23 and 30 inches in 1923-24. The cost of removing the snow from the main highways was $1,200 the latter winter, and the equipment was out 8 days. Thirty men were used in snow-removal activities.

Sedgwick County, Kans.—M. Rosbury, County Engineer, Court House, Wichita, Kans., reports that one Baker plow on an FWD truck and one Baker V-type plow on a 10-ton Holt tractor make up the mechanical equipment for snow removal. The total cost of operation was $84 in 1923-24 for the removal of 15 inches of snow, and the equipment was out only 1½ days, using 6 men.

Wilson County, Kans.—C. T. Donald, County Engineer, Fredonia, Kans., reports that snow removal in Wilson County cost $1,851.68 in 1923-24.

Boone County, Iowa.—J. A. Illemay, County Engineer, Boone, Iowa, reports that snow removal in the winter of 1923-24 cost $1,310.

Buchanan County, Iowa.—O. L. Day, County Engineer, Independence, Iowa, reports that their mechanical equipment for snow removal includes a 10-ton Holt tractor, a 12-foot Baker straight-blade snow-plow, shovelers and patrol graders. Snow removal in the winter of 1923-24 cost $575.01, the equipment being used on 30 days and employing from 2 to 20 men.

Decatur County, Iowa.—Frank G. Mallette, County Engineer, Leon, Iowa, reports that their snow-removal equipment consists of crawler tractors and blade graders for light

snow, supplemented by hand-power gangs for the heavy drifts. Snow removal in the winter of 1923-24 cost $641.

Keokuk County, Iowa.—W. P. Morris, County Engineer, Sigourney, Iowa, reports that their snow-removal equipment consists of one 10-ton Holt tractor and plow. The total snowfall was only 20 inches in the winter of 1922-23, and double that amount in 1923-24. The mechanical equipment was used on 10 different days last winter, costing $300 for operation and using from 6 to 12 men.

Marion County, Iowa.—Robert T. Johnson, County Engineer, Knoxville, Iowa, reports that teams with light graders and drags and one Holt tractor with grader are used for snow removal. The operation of these outfits cost $300 in the winter of 1922-23 and $400 in 1923-24. In the latter winter the equipment was used on 7 different days and 60 men were employed. Mr. Johnson reports that the rural population objects to snow removal because of misinformation sent out by local politicians.

Palo Alto County, Iowa.—T. R. Martin, County Engineer, Emmetsburg, Iowa, reports that only hand shovels and blade graders are used for snow removal. The cost for removal was $800 in the winter of 1922-23 and $1,500 last winter.

Webster County, Iowa.—George Burnet, County Engineer, Ft. Dodge, Iowa, reports that shovels, fresnos, blade graders and snow-drags are used for snow removal. The operation of the equipment cost $2,500 in the winter of 1922-23 and $2,200 last winter.

Franklin County, Mass.—F. Deane Avery, County Engineer, Greenfield, Mass., reports

SNOW-FENCES PROPERLY PLACED MINIMIZE DRIFTS IN ROADS

At top—Wickwire Spencer snow-guard in place. Below—Drifted snow at side of roadway permitting highway to be used immediately after storms, with very little snow removal

two 12-foot graders, and thirty 8-foot patrol

crawler tractors and blade graders for light

A BARBER-GREENE SNOW LOADER EQUIPPED WITH A TRAILER FOR SIDE DISCHARGE IN USE IN BOSTON, MASS.

This machine made a record of 112 hours continuous loading, handling 7 yards in 45 seconds and an average of 1,600 cubic yards per 8-hour shift. The cost of hand loading was 47.3 cents per cubic yard before the machine was purchased, and with the machine only 7.6 cents per cubic yard

that the county does not handle snow removal, but that work is well taken care of by the town of Greenfield, which has a 10-ton Holt tractor and a Sargent plow, as well as two Fordsons and a Packard truck equipped with blade and V-type plows.

Dickinson County, Mich.—Paul Israelson, Engineer, Iron Mountain, Mich., reports that the county owns two 10-ton Holt tractors and one home-made snow-plow. The cost of snow removal in the winter of 1922-23 was $4,656.13 and in 1923-24, $4,929.87. The snow removal equipment was used on 65 days during the winter. The number of men employed in snow removal varied from 10 to 20 both winters.

Macomb County, Mich.—Walter J. Lehner, County Engineer, Mt. Clemens, Mich., reports that the county owns three Champion snow-plows for attachment to trucks. Snow removal in the winter of 1923-24 cost $1,500.

Washtenaw County, Mich.—A. R. Bailey, Engineer-Manager, Ann Arbor, Mich., reports that the county owns two Baker straight truck plows, two Champion straight truck plows, four Fordson graders and two Grand Rapids spring scrapers which are used for light work. The equipment was used 20 days during last winter and between 10 and 20 men were employed.

Lac Qui Parle County, Minn.—Fredrik Roe, County Highway Engineer, Madison, Minn., reports that the ordinary equipment of the patrolman constitutes the equipment for snow removal. The cost for snow removal in 1922-23 was $1,762, and for 1923-24, $1,142. During the earlier winter between 16 and 30 patrolmen were employed in snow removal, and last winter 23 were used.

Murray County, Minn.—J. A. Myron, Highway Engineer, Slayton, Minn., reports that the country relies on patrol graders, hand shovels and snow-fences to keep the highways clear. There has been very little trouble in the last three years with snow on the roads because the grades are built above the level of the surrounding country as much as possible and snow-fences prevent the accumulation of drifts.

Otoe County, Nebr.—H. C. Schwaderer, County Highway Engineer, Nebraska City, Nebr., reports that the mechanical equipment for snow removal consists of two 10-foot blades, one 12-foot blade, and one Baker snow-plow. Snow removal cost $350 in the winter of 1922-23 and $400 in the Winter of 1923-24. In the latter winter the equipment was used on 30 days, the number of men varying from 7 to 12.

Pierce County, N. Dak.—Herbert J. Bardell, County Surveyor, Rugby, N. Dak., reports that Pierce County's mechanical equipment for snow fighting consists of one Moline tractor and road blade grader, two teams, and a V-type snow-plow. The last two seasons the total snowfall has been 15 and 10 inches, respectively, and the equipment was used on 20 days

At top—Wickwire Spencer snow-guard in place. Below—Driver [illegible] used immediately after storms, with very little snow removal

last winter. The maximum snow-fighting force a year ago consisted of two teams and three men, and last winter of one man and the tractor.

Van Wert County, Ohio.—Otto Witten, County Surveyor, Van Wert, Ohio, reports that they have a truck and road grader for snow removal. The total snowfall in the winter of 1922-23 was 6 inches and last winter was 30 inches. The equipment was used 6 days last winter at a total cost of $500 and 30 men were employed.

Lawrence County, S. Dak.—Frank S. Peck, Superintendent of Highways, Deadwood, S. Dak., reports that their snow-removal equipment consists of a grader and Holt tractor.

Cowlitz County, Wash.—E. A. Middlebrooks, County Engineer, Kelso, Wash., reports that an old-fashioned split drag pushed by an FWD truck is used for snow removal on paved roads. The total snowfall has been only ½- and ¾-inch in the last two winters.

Pend Oreille County, Wash.—J. C. Stegner, County Engineer, Newport, Wash., reports that the highways are opened with Champion plows and trucks by state forces.

Trempealeau County, Wis.—Emil F. Rotering, Highway Commissioner, Whitehall, Wis., reports that several trucks are used for snow removal, which has cost $100 in each of the last two seasons. The snowfall has been 12 and 24 inches, respectively, and the trucks were used 4 days last winter, employing 5 men.

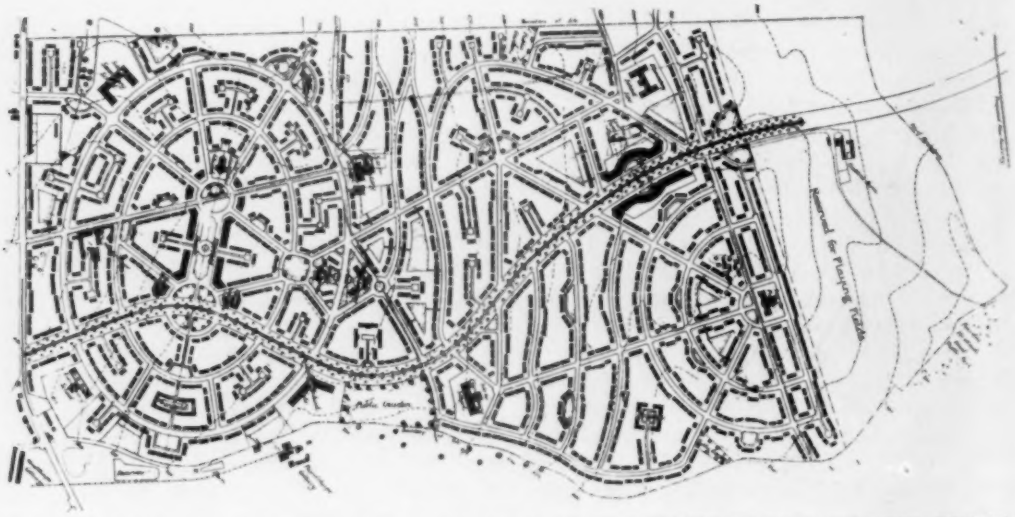
A Suburban Subdivision in Sheffield, England

IN the recently published report on "Sheffield: A Civic Survey and Suggestions Toward a Development Plan,"* prepared by Patrick Abercrombie and R. H. Mattocks, is given a list of the various suburban estates developed by the Sheffield Estates Committee, the area of each, and the number of houses so far completed.

The development of these estates has been carried out according to the following general scheme: houses at the rate of twelve per acre, and in groups of two, four and six; no separate back approach to the houses; a distance of between 60 and 70 feet between the backs and fronts of the houses; roads of varying widths to suit traffic needs, the purely residential needs being reduced to the minimum of street works; the use of decorative open spaces to relieve the continuity of houses, and other similar features.

One of the most interesting of these housing schemes is the Manor Estate, illustrated herewith, which is now in the early stages of its development. This is the largest scheme so far ventured by Sheffield, and includes the erection of 3,754 houses, 107 of which were completed at the time the report was published. As may be seen, the layout also makes provision for two shopping centers situated upon the section of the new Ring Road which traverses the site, and also for public buildings, schools, churches, playing fields, and public gardens. Such features as these have been included in all Sheffield schemes over a certain size; thus they are not mere tracts of efficiently planned housing accommodation, but are conceived as social units fitting into the life of the whole community.

* For a brief review of this report, see page 403 of the October, 1924, issue of THE AMERICAN CITY.



PRELIMINARY LAYOUT AND DEVELOPMENT PLAN OF THE MANOR ESTATE HOUSING SCHEME, SHEFFIELD, ENGLAND

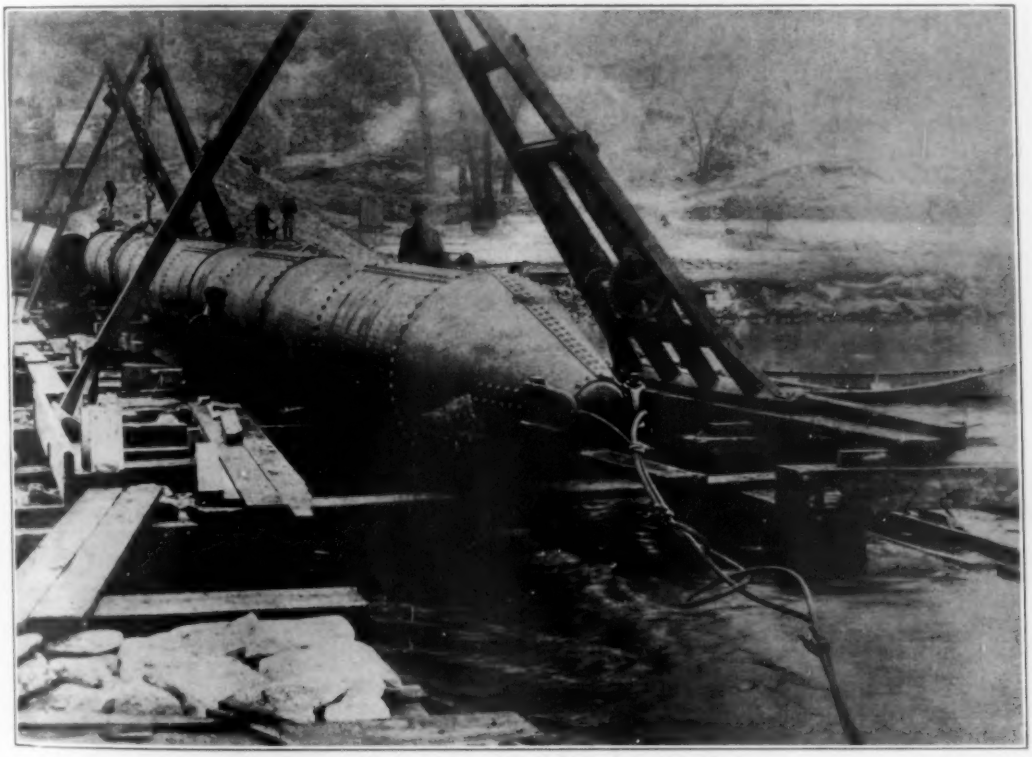
Laying a Subaqueous Water-Main at Minneapolis

Four-Foot Pipe Laid Across Mississippi River Under Difficulties

WHEN the Minneapolis water distribution system required the crossing of the Mississippi River just below the Falls of St. Anthony with a 48-inch riveted steel pipe ½-inch thick, the engineers were faced with a problem. The river at this point passes through a gorge some 900 feet between bluffs, which, on the east side of the river, reach a height of about 100 feet above low water and on the west side, 72 feet. On the east side there are 39 feet of sand and gravel to the Trenton lime rock; on the west side, about 11 feet from the top of the ground to the lime rock, which is of the same elevation on both sides of the river. This rock is 25 feet thick and separated from the underlying St. Peter sandstone by 3 feet of shale. The St. Peter sand rock is some 800 feet thick. The river has cut through the rock, and the river bottom is filled with broken débris of lime rock and boulders; at the deepest point about 40 feet, then the sand rock.

In order to make this crossing, 8-foot shafts were sunk on both sides of the river, and 8 x 7-foot tunnels extended from the shaft to the edges of the bluffs, 340 feet long on the east side and 60 feet long on the west side, and trenches were dug on the shores as far as possible. Work was started in January, 1923. As the current is very swift at all stages of water, it was necessary to do the river work proper in extreme low water, which occurs from the end of December to the middle of March, mostly in weather below zero. The problem was, how to excavate the trench in the material mentioned. Pile driving was impossible, and the water was too swift and shallow to permit the use of a dredge.

It was decided to build cribs 4 feet wide and 8 feet long, made of 10 x 12-inch timbers, with partly planked bottoms, each to be loaded with about 2 tons of rock. These cribs were



TORPEDO HEAD OF RIVETED STEEL PIPE HAULED ACROSS THE RIVER AT MINNEAPOLIS, MINN.

placed about 14 feet apart on centers across the river, and 16 feet on centers up and down the stream. On the cribs across the river, 24-inch I-beams 28 feet long were laid flat to form a running-track for the excavator, which was a stiff-leg derrick fitted with grooved wheels which traveled on 40-pound rails laid loose on the I-beams. The plan at first was to handle a ½-yard orange-peel bucket with this derrick. Before building the cribs, some excavating was done with this rig on the low shore on the west side, and it seemed as if the material could be handled that way. Accordingly, the placing of the cribs across the river was carried through and the runway completed from shore to shore.

The derrick was then sent back to the west end, and excavating operations continued with the orange-peel bucket, but as soon as the river was reached it was found that the bucket would not work satisfactorily at all, and the rig for excavating was changed by attaching to the boom of the derrick a dipper stick, placed about 20 feet from the end of the boom, with a ¾-yard steam-shovel dipper. The excavation with this machine commenced February 18, and the ditch was finished March 17. It was a very difficult piece of work. The material was exceedingly hard to handle; big pieces of ledge from earlier erosions were often encountered and they had to be dragged out. Some 2,500 yards of this stuff was excavated and dumped on the down-stream side. All small material was immediately washed away by the current, leaving the heavier stuff in place. As the excavation progressed towards the east side, the cribs were removed. I-beams were placed on the spoil bank as a track to carry the cribs, timbers and I-beams back to the west shore. These beams also formed the pathway between the excavator and the west side.

On March 21 riveting the 30-foot sections of the 48-inch pipe was begun, and on March 26 the work of pulling the pipe toward the east shore was started. The first section pulled had a torpedo-head to which a ⅞-inch plow steel iron-center pulling cable, fastened with Crosby clips, as shown in the illustration, was attached. This first section was 120 feet long. There were also two lugs on the inside of the torpedo head to which a ⅞-inch plow-steel cable was fastened with Crosby clips. This cable was kept anchored to the west bank. The pulling was done with an American hoisting engine through two sets of triple blocks. After the first section was pulled, 30-foot sections were added and pulled. On March 30, a total of 486 feet of pipe had been pulled out over the river, and another day would have landed the end on the east shore. However, luck was against the engineers in charge and on this very day the ice broke in the upper river—about two weeks ahead of the usual time—and a big ice gorge, which had formed about 15 miles above the falls, broke, releasing a flood of about 54,000 cubic feet per second, which is very nearly the maximum flood record on the upper Mississippi since 1860, when 60,000 to 65,000 cubic feet came down. The flood picked up the heavy pipe like a straw and laid it down-stream on the flat west shore, only shearing part of the rivets in one joint at about the middle of the pipe. The inside cable anchored on the west shore saved the pipe. A few days afterwards, ten million feet of logs broke away at Anoka, 18 miles from Minneapolis, and came down over the falls and cleaned out the spoil bank, I-beams and all. The beams were picked up later.

After such a series of mishaps, nothing could be done until the river went down again. In July the pipe was taken from where the flood had left it, straightened, joints repaired and tested, and placed in position for handling again under low-water conditions. Meanwhile, the work of building shafts and tunnels had gone on, and was completed on May 27. The shafts were lined with concrete and the tunnels with 6-inch vitrified tiling.

The flood had completely filled the ditch with sand, gravel and smaller boulders, and it was decided that the surest and best way to clean it out would be with a dragline excavating outfit. This was arranged as follows: The track cable was started from a 14 x 14-inch mast, 48 feet high, set up on the east shore. The elevation of the cable hitch was about 116 feet, the west end of the cable being fastened to a bridle cable subject to pull up or down stream, with a set of ¾-inch double blocks at an elevation of about 31 feet. The total span was about 980 feet. The track cable was 1¼-inch plow steel, the load line was ⅝-inch plow steel, and the tension line was ¾-inch plow steel. All fastenings were made with Crosby clips, and an American hoisting engine rated at 25 h.p., with a steam pressure of 125 pounds, was used with a ½-yard bucket. A 20-h.p. engine was placed on the west side. Setting up the cable and engine began September 11, and dragline excavation on the river proper began October 16, and was finished on the 20th of January, 1924.

On January 22 the pulling of the river sections of the pipe was begun again, and this phase of the work was finished on January 31. The last pull was about 15 feet of a total length of pipe of 698 feet. This, together with the constant wetting to which the cable and clips were submitted, furnished a severe test, which, however, showed the equipment well able to meet all requirements. As the pipe was pulled and sections added, water was let into it on the west end so as to keep it just about afloat above the bottom of the trench. It was gradually lowered into place from the west end, and closed in and riveted by February 9. On the east end, a coffer-dam had to be built over the pipe, to permit cutting off the torpedo-head, putting in the remaining sections and making connections with the end of the pipe at the mouth of the east tunnel. Much trouble was experienced in unwatering the coffer-dam, as sand rock was encountered inside the dam, and no puddle clay could be secured because of the extreme cold weather, about 20 degrees below zero at that time. However, the east end work was closed in on March 10.

As soon as the pipe had been properly placed, on February 12, the work of anchoring it started. This was done by placing very coarse fabric bags filled with sand and cement mixed 1:4 around the pipe, filling the entire trench in spots. Ten such anchors were placed, containing 18,000 sacks. The sand and cement were delivered at the top of the west bluff. The sand was heated and mixed dry with the cement in a small mixer and the sacks filled, slid down a plank chute, wheeled to the river edge, and then loaded on the dragline bucket, which was fitted with a platform large enough to hold twelve bags. The engine on the east bank pulled the bucket out over the pipe in the river, and the engine on the west bank pulled it back. As soon as the sacks had been thrown into place, holes were punched in them with sharp-pointed rods to speed up the wetting of the contents. The cement set satisfactorily, and the work was completed March 3.

On March 21 the entire work on the east side was completed and the coffer-dam removed. With everything ready, the expected flood came on April 4. The ice gorge broke about 14 miles above the falls and came down very violently, but without doing any harm to the main, and the débris carried by the flood water served to fill up the remaining open portions of the pipe trench.

ACKNOWLEDGMENT.—Text and illustration by courtesy of the *Crosby Clipper*, published by the American Hoist & Derrick Company, St. Paul, Minn.

A Study of the Value of Reinforcement in Concrete Roads

THE details of plan and procedure to be followed in the investigation of the economic value of reinforcement in concrete roads, being undertaken by the Highway Research Board of the National Research Council, are now completed and field examinations are about to commence. Director Charles M. Upham reports that the various state highway commissions will actively cooperate with the Board in conducting this investigation. Except in cases of actual failure, inspections will concern principally pavements having had at least five years of service, a great number of which are located in New Jersey, Ohio, New York, Pennsylvania, Delaware, Wayne County, Mich., Milwaukee County, Wis., Iowa, Illinois and California.

In this intensive study an effort will be made to determine, from a survey of existing roads, the influence of steel reinforcement on the resistance of the slab to traffic, subgrade, and climatic conditions; the conditions under which steel reinforcement is especially beneficial to concrete slabs; the effect of slab design on the efficiency of reinforcement; and, finally, the relative cost of plain and of reinforced concrete roads, considering the initial investment and the annual maintenance and renewal charges.

The procedure will consist of a personal examination of a sufficient number of existing road surfaces to cover different slabs, traffic, and climatic conditions. It is proposed to supplement the examination by photographs, sketches, soil determinations, and other available data. In each case, attention will be given to a study of the subgrade to determine its general characteristics and properties as well as the existing drainage conditions. In the case of the slab, a study will be made of original data to determine the materials and proportions that entered into the concrete, the method of construction that was followed, and the particular cross-section used. Careful note will be made of joints, cracks, replacement areas, and general surface conditions. The influencing factors of grade, alignment, location, and maintenance will be noted, and the matter of age, traffic, and climatic conditions will be given careful consideration. In the case of the reinforcement, a study will be made of the relative amounts of longitudinal and transverse steel, the method of treating reinforcement before placing, as well as its position in the slab. The form of the reinforcement will receive consideration to determine the relative values of fabric, rods, and other types in use. An effort will be made to determine the comparative value of hard steel and of mild steel for reinforcement, and the influence of continuous and non-continuous reinforcement. Wherever possible, the present condition of the reinforcement will be noted for breaks, rust, and other features of interest. Wherever obtainable, cost data will be secured covering the original as well as the maintenance investment.

Community Values in Christmas Seals

By Philip P. Jacobs, Ph. D.

Publicity Director, National Tuberculosis Association, New York

"PUBLIC education"—that is the big cry in these democratic days. And probably there has been no advance in any phase of education that counts heavier for individual and community betterment than the advance made in the ways of health. The realization of what sickness means in suffering, in sorrow, and in economic loss has resulted in intelligent and systematic organization and virile programs directed against all preventable illness.

One disease especially has been combated with great success, namely, tuberculosis. Five years ago a health demonstration was begun in Framingham, Mass., an average American small town, for the purpose of controlling tuberculosis. It was found that it cost approximately $2 per capita per annum to pay for an efficient public health program with special emphasis on the prevention of tuberculosis. But during the five years of the demonstration the death-rate from tuberculosis was reduced 67 per cent.

A $2 per capita health investment would cost a city of 25,000 population $50,000. It has been estimated that if tuberculosis could be eliminated as a cause of death, an average of 2½ years would be added to human lifetime. This at $100 a year net economic gain to the community—certainly not a high value for a person to put upon himself or herself—would mean a gain of $250 per person, or $6,250,000 to the community. This, of course, is not an annual gain, but a gain spread over the whole life span of the present generation of approximately 55 years. If we divide the $6,250,000 by 55, the annual gain will be well over $100,000 annually for the community—twice what the $50,000 investment in health would be. The saving in happiness for families and friends can, of course, never be estimated.

The laws for health that any community can follow are simple enough. Plenty of fresh air, nourishing food, a proper amount of rest and exercise, are the basic necessities of good health. Another important rule in the health game which should become a national habit is the periodic physical examination in order to keep track of the general condition of the human machine. We hear so much about overhauling automobiles, locomotives and turbines, but so little about overhauling our bodies. One hundred per cent efficiency depends as much on 100 per cent condition in the human machine as in any other.

Good health is, after all, the first essential to success. We have seen what poverty and disease following the war have done to several European nations. Our people are generally supposed to be fairly healthy, yet at the present time there are nearly one million active cases of tuberculosis and as many persons with the disease in an inactive state living among us.

The educational work of the National Tuberculosis Association and its 1,400 affiliated state and local organizations during the past fifteen years has helped to reduce the death-rate from over 200 per 100,000 persons to less than 100 per 100,000. Their desire is to control the disease through urging good health habits and periodic examinations. Hospitals, sanatoria, public health nurses, clinics where people may go for examinations, publicity of all kinds, and the training of children in the schools through the Modern Health Crusade are some of their media. The financial support of their work is derived from the penny Christmas seals sold annually in December.

City officials, such as mayors, city managers and heads of municipal departments, and also chamber of commerce secretaries and other executives of civic organizations can be of great assistance during the Christmas seal sale. Through understanding what the organized educational work can mean in the community, their personal interest and sympathy will go far toward influencing others to support the Christmas seal campaign. Not only can they purchase the seals, but they can get in touch with the local tuberculosis workers and lend in some cases really practical help, and in all cases most valuable moral support, to the cause. Further suggestions of ways in which to cooperate may be secured from the Association, 370 Seventh Avenue, New York.

Chamber of Commerce Activities in Public Affairs

City Planning—The City Practical

PLAINFIELD, N. J.—Of the many municipal problems that have come to the writer's attention during his five years' experience as a chamber of commerce executive, the question of city planning seems to be subject to more misconceptions than any other. The average citizen and the average municipal official apparently think of city planning as something that has to do solely with beauty, and frequently that activity is catalogued as a more or less useless one.

As a matter of fact, city planning is one of the most practical ideas that a municipal government can adopt, and if it deals in any way with the city beautiful, it does so only through such beauty as naturally follows the execution of needed municipal improvements. Every city should adopt a city plan, whether the city be a growing, active municipality within a metropolitan area, or a non-growing community in an isolated territory.

About two years ago the Chamber of Commerce of the Plainfields appointed a committee to make a study of city planning. During the first year nothing was accomplished other than a study of standard literature on the subject. We failed to impress our municipal government with the fact that city planning is particularly useful, and there seemed no prospect of our making any progress in that direction. It so happened, however, that at the start of the second year of our city planning study, we discovered, through our usual workers' questionnaire, a new member who had recently become a resident of Plainfield, and who had been interested in and had had experience in city planning in two other cities. With the help of suggestions made by this newcomer, a program of necessary data was outlined, and it was then only a matter of a few months before the committee had mastered the basic principles of a city plan.

We realized that a city plan is a great co-ordinator of city government departments and the needs of a city. Our study pointed out that a municipal government cannot be economically operated unless all the needs of all its branches for a period of at least twenty years in the future are properly listed. It indicated that the right way to administer municipal government is to foster first such improvements as will benefit the greatest number of people at the most reasonable cost, rather than to execute improvements in accordance with political pressure exercised by small groups acting selfishly or particularly interested in some one project.

One of the first steps taken by the Chamber's committee was to ascertain the net debt of the city. The probable increase in assessed valuations each year was then estimated, and a table showing the amount of bonds that would be retired yearly was compiled. As a net result, we learned the approximate amount of capital expenditures that could be made during the next sixteen years.

In our preliminary city planning report* we catalogued what we believed to be the requirements of the various city departments over a period of years. It is evident, however, that the complete fulfillment of these needs would necessitate an expenditure several times greater than the amount of money that will be available for such purposes. The next step needed in this city, therefore, is the appointment of a permanent official city planning commission, whose responsibility it should be to devise a final, workable plan, based on the data already compiled by the Chamber's unofficial committee.

WILLIAM H. PFAU,
Secretary, Chamber of Commerce of the Plainfields.

An Ordinance to Regulate Outdoor Advertising

NEWPORT, R. I.—Believing that bill-boards and other forms of outdoor advertising have little use in a beautiful city like Newport, and that they are a liability to the community, the Chamber of Commerce, through a campaign of publicity and with the cooperation of the Newport Garden Club, has recently secured the passage of a very strict ordinance regulating the erection and maintenance of all forms of outdoor advertising. The ordinance covers a broader field than is usual in such ordinances and supplements the zoning ordinance already in effect in this city.

As defined in the ordinance, "outdoor advertising" includes all advertising now or hereafter displayed in the city so as to attract the attention of persons on the highways or on any public carrier, or while in any public building, or park, or other public place, by means of printing, writing, picture or combination thereof, and by any means of display. The only exception is advertising relating to business conducted on private property, to the sale or rental thereof, or advertising in the stations and cars of common carriers.

For every sign or bill-board of greater area than 12 square feet, consent in writing must be obtained from a majority of the owners or agents of the property on both sides of the street in the block where the sign or bill-board is to be erected. With the written consent of the property owners, plans for the structure (which must be fireproof) must be filed with the building inspector, who will determine whether the proposed sign or bill-board is in accordance with the ordinance, and who has the authority to grant or refuse the permit.

* Six hundred extra copies of this report have been printed, and a copy will gladly be furnished to any reader of THE AMERICAN CITY interested in the subject, upon request to the author.

Every sign or bill-board to be erected must be at least 4 feet above the natural surface of the ground, must not exceed 14 feet in height overall, must be at least 6 feet from the side of any lot line, must be at least 15 feet back from the street line, and must be limited to 400 square feet in area.

No bill-board will be allowed at any corner of any public way nor within 50 feet of the intersection of any street, nor within 300 feet of any school, public building, church, park, pier, beach, playground, hospital or eleemosynary institution. Any picture of obscene, licentious, or immoral character, on any bill-board or sign-board, in any window or upon any building in any public place or in public view, is prohibited.

There is a fine of $10 per day for each day of violation of the ordinance, and the building inspector is authorized to inspect and remove any and all boards not in conformity with these regulations.

It is estimated that with the enforcement of this ordinance in conjunction with the present state law on bill-boards at least 50 per cent of the bill-boards already erected in this city will have to come down, and there is little likelihood of the erection of any additional boards in the business or industrial zones on account of the severe standard required. In the residential zones no more will be erected, as the City Attorney has already ruled that bill-boards are a business, and also because it will be scarcely possible for any applicant to comply with the requirements of the new ordinance.

W. C. CAMPBELL,
Secretary, Newport Chamber of Commerce.

Chamber Cooperates in Achievement Day Program of Farm Bureau

Boone, Iowa.—One of the activities of the Boone Chamber of Commerce this year, that we believe has been particularly beneficial to the city, was the cooperation of this organization in the Achievement Day program of the Boone County Farm Bureau. Once each year, shortly before the time of the Iowa State Fair, the farmers of Boone County, with their sons and daughters, bring to this city their live stock—baby beeves, hogs, etc.—that are to be entered at the State Fair. The young people also bring the various articles that they have made during the year in connection with the boys' and girls' clubs in their home towns.

When the officers of the Farm Bureau sought the assistance of the Chamber in planning this year's program, the Board of Directors gladly accepted the opportunity to cooperate, and by so doing to prove the city's interest in the farmers and their work. As one of the principal features of the day's events, we planned a parade of floats, in which the business firms of the city were invited to take part along with their rural neighbors. In the parade, which extended nearly two miles, it was gratifying to find the city well represented. Many of the floats were most elaborately decorated, and prizes in cash were offered for the finest in both the city and rural classes; also for the best floats in each division of the cattle and hog clubs, and for the boys' and girls' demonstration teams. An exhibition was then held at the city armory, with a splendid attendance of both merchants and farmers.

Through the help that the Chamber was able to render on Achievement Day, there has been established a fine spirit of friendship and unity between this organization and the County Farm Bureau. An even bigger and better exhibit next year is planned for, and we have reason to believe it will be a real success.

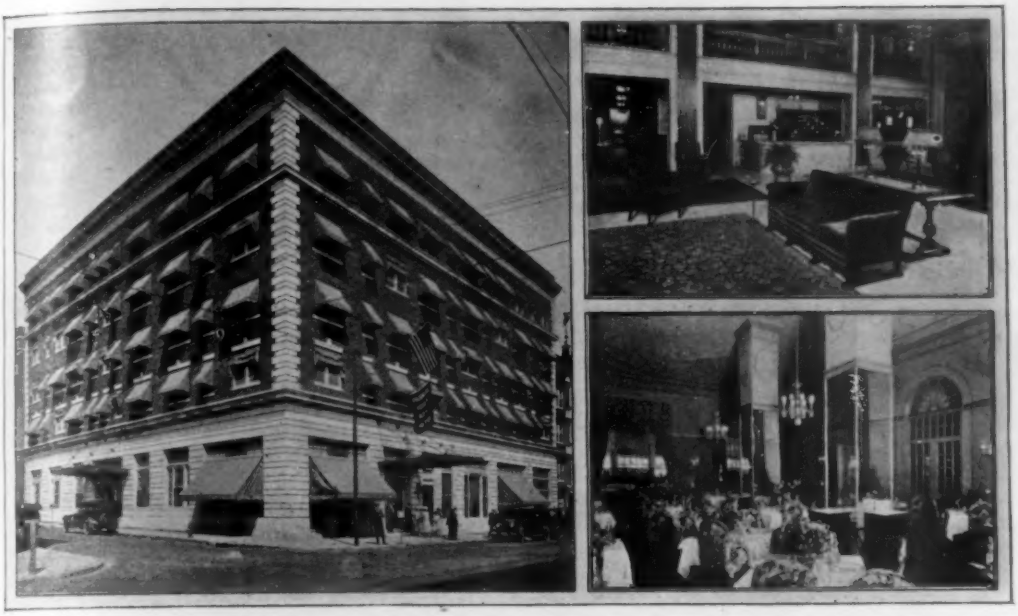
J. R. BRUNTON,
Secretary, Boone Chamber of Commerce.

Hotel Financed by Community Effort Proves Valuable Civic Asset

Frederick, Md.—The exceptional hotel facilities that this city has been able to offer since the opening of the Francis Scott Key Hotel have become one of the community's outstanding assets. The construction of this modern hotel, with its 205 rooms and 5 dining-rooms, representing an outlay of approximately $1,275,000, was sponsored by the Frederick Chamber of Commerce and financed by community effort.

For several years it had been realized that the progress of the city was hampered by the lack of adequate hotel accommodations, and the first definite steps toward remedying the situation were taken by the Chamber of Commerce. A hotel committee was appointed, and the possibilities for securing a hotel that would meet the existing needs, and that would at the same time be a credit to the community, were carefully considered. The acquisition of the necessary funds proved to be the outstanding problem, and it was deemed advisable to seek the assistance of some organization specializing in the financing of such projects. The Hockenbury System Inc., of Harrisburg, Pa., was called in to make a survey of the community, and subsequently a campaign was inaugurated for the sale of preferred stock in the hotel. Through the activities of the Chamber and the organization of a large volunteer sales force, a sale of $505,000 of preferred stock was completed within a

PART OF THE ACHIEVEMENT DAY PARADE IN BOONE, IOWA



THE FRANCIS SCOTT KEY HOTEL, FREDERICK, MD., WITH ITS LOBBY AND DINING-ROOM

week. A 6 per cent first mortgage bond amount-to $400,000 was placed through local banks at par, while a three-year debenture note issue was made for $125,000.

At the end of its first year of operation, the company to which the hotel has been leased on a twenty-year basis was able to take care of all bond interests and sinking fund, and declared a 7 per cent dividend on the full amount of stock issued. Not only is the enterprise proving a financial success, but the hotel is now looked upon as the real civic center of the community, and provides ample accommodations for the meetings of the various local bodies.

W. U. GAVER,
Secretary, Frederick Chamber of Commerce.

Water-Mains Laid by City Forces

HAINES CITY, FLA.—As a result of rejecting all bids for a proposed addition of 22,000 feet to the city water-main system here some time ago, members of the Haines City Council have been presented with a report showing that city employees made the improvement, under city supervision, for $7,623.24 less than the lowest bid from contractors.

According to the report, the lowest construction estimate received from an individual or firm of contractors was $36,500. Added to this was a necessary item of $638.36 for attorney's fees, advertising and printing, making a total estimate of $37,138.36. After several days of discussion as to the best method of procedure, during which Alderman Jess P. Ferrill and City Engineer R. A. Sterzik presented figures to show that the city could lay the main less expensively, the aldermen decided to "do it at home."

The 4½ miles of water-main was laid within the allotted time named in previous advertisements for bids, according to the report, which went on to give an itemized statement of expenses. In addition to the 22,000 feet mentioned in the appropriation, the city employees laid 400 feet of water-main between the high school and the nearest thoroughfare, which was estimated as an asset of $500, and had remaining in stock another asset in the shape of stock valued at approximately $500.

A summary of the itemized statement presented to the Council shows the following expenditures: labor, $1,000; digging ditch and back-fill, $975; material, $27,901.76; and attorney's fees, advertising and printing, $638.36. Credited against the expenditure was $1,000, representing the main laid to the high school, and the stock on hand at the completion of the work.

This made a total of $29,515.12, which gave the city a saving of $7,623.24 over the lowest bid offered by any of the contractors.

REX SAFFER,
Secretary, Haines City Chamber of Commerce.

Stadium Financed by Selling Advertising Space

BESSEMER, ALA.—The acquisition of land for a city athletic park and the erection on that site of a $7,000 stadium, is one of the recent projects launched by the Bessemer Chamber of Commerce and successfully completed with the aid of this organization. The purchase by the city of a 16-acre plot of land adjoining the city limits had often been discussed by some of our progressive citizens, who felt that the site would prove to be a valuable asset to the community, and the directors of the Chamber were fully in accord with the idea. This organization therefore took the initiative in making a proposal that if the city would acquire the land, the citizens themselves would assume the responsibility for its improvement and development for recreational purposes. The suggestion met with the approval of the City Council, the land was bought, and plans for the athletic park went forward.

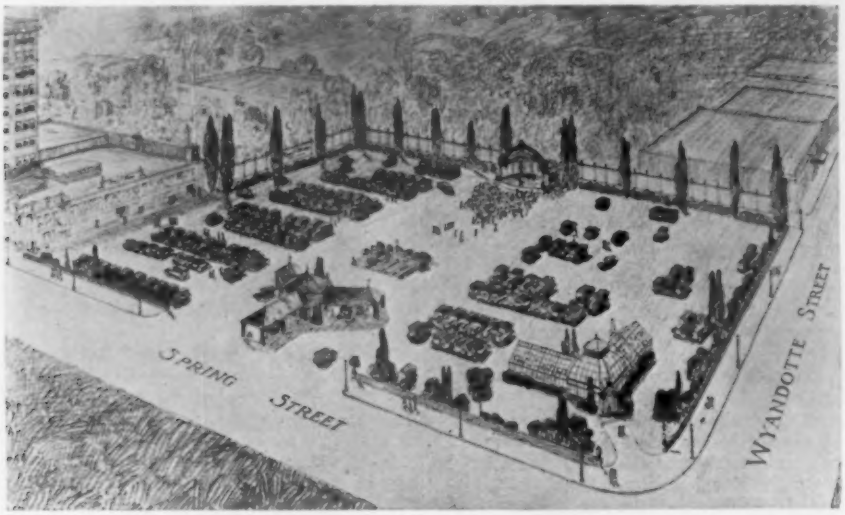
A Park Commissioner was then appointed and confirmed by the City Council, and a committee of five men, selected from the local Kiwanis Club, Rotary Club, Chamber of Commerce, and City Council, with a fifth man representing the community as a whole, was assigned to work with the Commissioner. These men took it upon themselves to devise a scheme for financing the construction of a stadium, with a grand stand, bleachers, and a surrounding fence. They chose the method of selling advertising space on the inside of the fence, on contracts covering a period of five years, and this met the situation very satisfactorily.

The accredited high schools in this section, as well as our city schools, now hold their football games at the Bessemer stadium, with the result that the park is being maintained at a profit and the school teams are receiving some financial support.

A. F. AUSMAN,
Secretary-Manager, Bessemer Chamber of Commerce.

Free Parking Space for Kansas City

IN the artist's sketch reproduced herewith may be seen an interesting innovation in automobile parking stations, described in a recent issue of *Kansas Citian*, the house organ of the Kansas City, Mo., Chamber of Commerce. This free parking space, covering an area of 472 feet by 288 feet, is being laid out by the Stop and Shop Company in connection with the large retail market now under construction by that company in Kansas City.



FREE PARKING SPACE WILL BE A FEATURE OF THE STOP AND SHOP MARKET IN ST. LOUIS

In the center of the area will stand a terra cotta gasoline station, with a 150-foot driveway, and at the northwest corner a glass conservatory, to be used strictly for the sale of flowers, will be erected. These two features are being constructed at a cost of about $10,000 each. Leases for both the conservatory and the gasoline station have already been signed. In the center of the south line of the parking space, a large canopy and stage will be built, and it is the intention of the management to make this available for use by the city or any civic organization for evening, Sunday, or holiday band concerts, or other civic entertainments. The parking space will not be used after six o'clock in the evening, except on Saturdays, when it will remain open until a later hour for the convenience of those who wish to patronize the market.

EIGHT NOTABLE REPORTS ON STREET AND HIGHWAY SAFETY

Beginning November 23, there are being released by the Department of Commerce, Washington, D. C., a series of pamphlets prepared by the various committees of Secretary Hoover's National Conference on Street and Highway Safety. The subjects of these reports are: I. Statistics; II. Traffic Control; III. Construction and Engineering; IV. City Planning and Zoning; V. Insurance; VI. Education; VII. The Motor Vehicle; VIII. Public Relations. The reports are being made available for consideration in advance of the National Conference on Street and Highway Safety, which is to be held in Washington, December 15-17. Copies of the reports and information regarding the conference can be secured on application to the Department of Commerce.

Bringing Business Men Into the Picture

By Richard F. Grant

President, Chamber of Commerce of the United States

WHEN you find a man who has the ability to visualize business opportunities and organize them and make them realities, something always happens. You see great cities and institutions springing up; vast numbers of people coming together; all of the problems that come with community life—crime, disease, unemployment, traffic congestion; rapidly spreading and rapidly growing communities outreaching the bounds and possibilities of the community to keep pace with. Those are the things that follow in the aftermath of the man who sees business opportunity and makes it a reality.

The trouble with the situation, as I see it, is that the man who has the ability to create these things and build up our great urban centers is content to keep his eye on the balance sheet and not go out and straighten up the awful messes he creates of his ability.

How are we going to get him to do it?

Business men are business men primarily because they have the ability to measure facts and reach conclusions; the conclusions must be correct most of the time or they will automatically cease to be business men.

That same ability which makes a man a business man, applied to his community and business problems, is going to see us through. Our principal trouble is with the business man himself. In the past, he has been a tremendous asset to himself, but almost a total loss to the civic life of the country. I am serious about that. To bring the ability and the trained experience of our business men to bear upon our community and our national problems is the first job of the chamber of commerce.

The whole problem, as I see it, is to bring the business man into the picture, making him sense his responsibility and function in the community and national interests. This chambers of commerce all over the country are gradually doing. As a result, such activities as extensions of sewerage and water-works, studies of municipal expenditures, the raising of money for all sorts of civic and philanthropic purposes, perfection of city governments, and on down through the varied list of activities which make for betterment in community life, are becoming the major problems in chambers of commerce to-day.

. . . . . .

Now, it has been my good fortune to work in chambers of commerce for quite a considerable period of time. Years ago when I first joined the Chamber, I wondered whether I got my money back from the dues, until I got to studying the whole movement and saw the whole significance of the thing—that it was the instrument by which we were going to bring our business men together for the solution of our great community and national problems. Until I saw that picture, I was in the position of a great many other men I know at the present time.

One of the great things that could be done by the secretaries of our chambers of commerce is to go out, and by careful, earnest work, bring that picture and that inspiration into the lives of our business men; get them to see that business does not exist for itself alone, but should be an instrumentality to better the common good and bring the best out of the business men for the public welfare.

From an address delivered at the annual convention of the National Association of Commercial Organization Secretaries, at Washington, D. C., October 21, 1924.

Play the Game!

By John H. Finley, LL.D

Associate Editor, New York Times

MANY years ago, in conversation with that great out-of-doors man and mountain-climber, the author of "The American Commonwealth," Lord Bryce, I was thanking him for an essay which he had written about an English schoolmaster. It was better than any of the essays that he had written of statesmen, prelates or great scholars. His voice choked and the eyes of this rugged man filled with tears as he replied—and then I knew why he had written best of this schoolmaster, Edward Bowen, of Harrow. But what I remember best of this biographical sketch was that he said that Bowen was always say-

ing to his boys, "Take the bitter with the sweet as the sweet and bitter come, and play the game."

Play the game! That is the essence of sportsmanship—playing the game. The value of play is that in most of its expressions, quite apart from the physical value of the exercise, it is teaching honesty, courage, fairness, quickness of decision, self-control, resourcefulness, loyalty. It teaches us to play the game of life honorably, bravely, adventurously and even reverently.

Michael Pupin, the great physicist, whose inventions have helped to make possible long-distance speech, coming to America as an immigrant youth from Serbia, gave this definition of what America meant to him. Perhaps some of you have read it in his memoirs:

"Play the game. What a wonderful phrase! I studied it long, and the more I thought about it, the more I was convinced that one aspect of the history of this country, with all its traditions, is summed up in these words. To 'play the game' according to the best traditions of the land which offered me all of its opportunities, was always my idea of Americanization."

Not only is play the birthright of every child born in this land where freedom to pursue happiness is promised to all, but it is the prerogative of the adult, as well, to keep till death ends both work and play. As some one has said, "People do not stop playing because they grow old; they grow old because they stop playing."

The first great commandment—and I say this reverently—is to play the game with all our heart and soul and strength. That is loving the Divine Creator. And the second great commandment, which relates to our neighbors, is like unto it. It is to play the game according to the Golden Rule. On these two commandments hang all the law of individual happiness and the prophecies of collective welfare.

May you all who are workers be transitive verbs—if you remember what they are—helping individual nouns to reach such objectives as I have defined.

From an address before the Playground and Recreation Association of America, at the Recreation Congress, Atlantic City, October 16, 1924.

Sports Which Are Popular in the Washington Parks

IN an address delivered before the joint annual meeting of the American Institute of Park Executives and the American Park Society with the American Civic Association, at Washington, D. C., October 8, by Colonel C. O. Sherrill, Officer in Charge of Public Buildings and Grounds of the District of Columbia, the following list was given of the principal athletic and recreational activities in the Washington parks, during the last fiscal year:

	Players	Spectators
Athletic field	4,750	19,300
Baseball	56,070	358,530
Croquet	5,928	
Cricket	450	10,500
Basket-ball	72	600
Football	20,376	134,700
Field hockey	4,618	15,100
Lacrosse	312	2,300
Horse hurdles	11,580	
Quoits	3,566	5,620
Polo	1,150	22,600
Soccer	2,172	29,350
Volley-ball	4,596	7,450
Tennis	95,045	
Picnic	34,320	
Archery	100	500
Sylvan Theatre—5 performances		7,500
Band concerts—80 concerts		66,288
Skating—11 days on pool	17,700	
Golf	277,777	
Bathing-beach (4,097 given swimming lessons)	179,130	193,000
Tourist camp—13,821 cars—44,356 persons—Average length of stay, 2 days		
Sand-boxes	6,084	
Boat-house	2,812	
Hurling	1,052	11,000
Speed-ball	1,330	9,050
Riding field	1,900	
Slag-ball	86	
Golf-croquet	86	

Colonel Sherrill said:

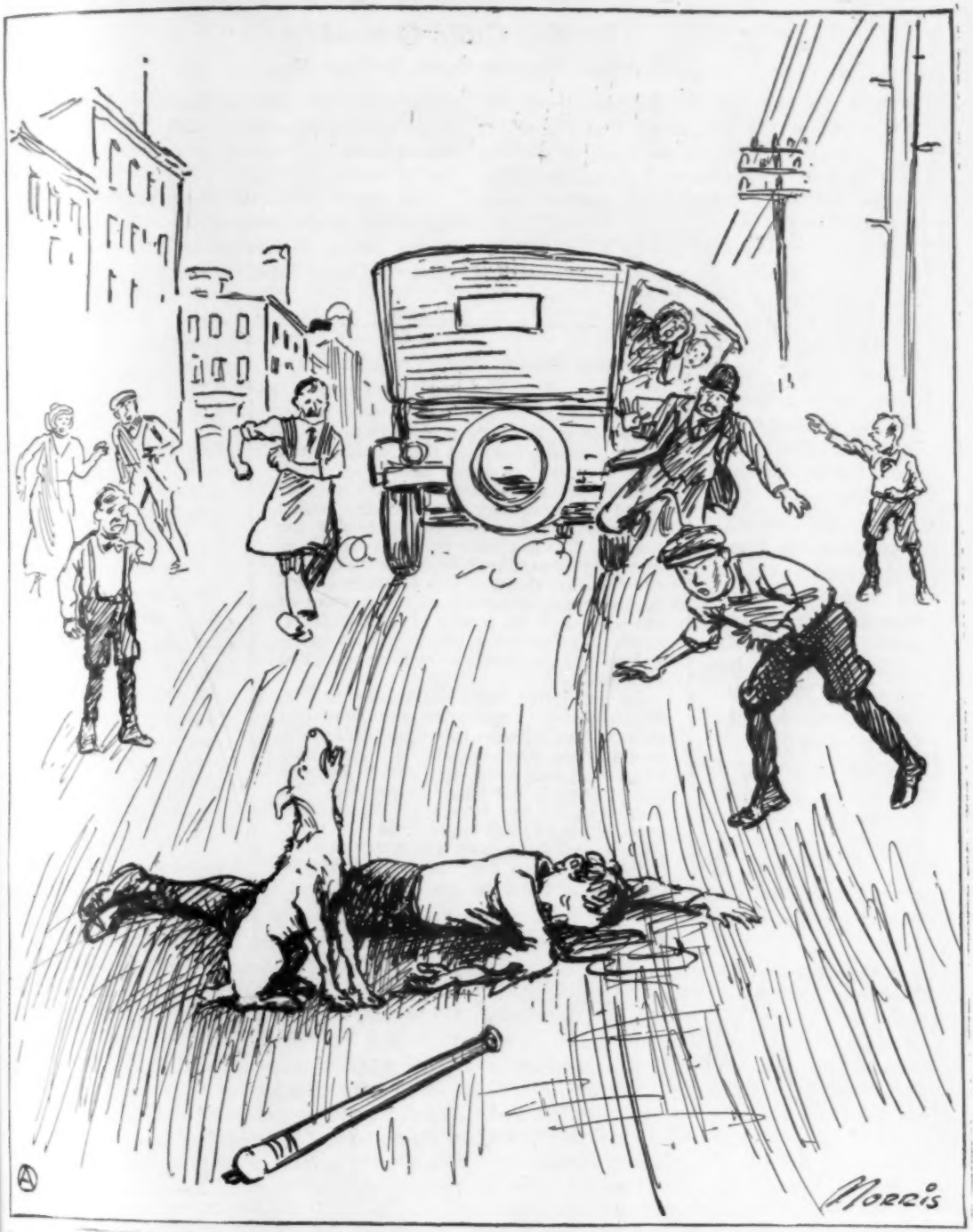
"Under the National Capital Park Commission, which has recently been created and which is authorized to expend $1,000,000 a year for purchases of lands for park and playground areas, I confidently believe that Washington will ultimately have not only adequate park areas, but adequate playground areas properly distributed throughout the entire extent of the city. It is my hope that in the course of the next few years one square will be set aside for park and playground purposes out of every ten or twelve squares of the newer part of the city. In many cases these squares can be ideally adapted to playground purposes and park purposes at the same time by creating playgrounds in the center of the squares, surrounded by an appropriate planting and parking between the playgrounds and the adjoining streets."

14,412 DEATHS FROM MOTOR VEHICLE ACCIDENTS IN 1923

The U. S. Department of Commerce announces that the returns show that during the year 1923, 14,412 deaths resulting from accidents caused by automobiles and other motor vehicles (excluding motor-cycles), occurred within the death registration area of the United States (exclusive of Hawaii), which area contains 87.6 per cent of the total population. This number represents a death-rate of 14.9 per 100,000 population, as against 12.5 in 1922, 11.5 in 1921, 10.4 in 1920, 9.4 in 1919, and 9.3 in 1918. In the 30 states for which data for 1918 are available, the actual number of these deaths increased from 7,255 in that year to 13,043 in 1923, the corresponding rates for these two years being 9.2 and 15.4.

FOR WANT OF A MUNICIPAL PLAYGROUND

By MORRIS



Copyrighted by George Matthew Adams Service

This is one of a series of civic cartoons which are now being prepared each month at the suggestion of THE AMERICAN CITY Magazine. They are being made available at small cost for use in local newspapers and in the bulletins of Chambers of Commerce and civic organizations. These cartoons will be found useful, also, as publicity aids for the adoption of municipal bond issues and in other campaigns for public improvements.

The Editorial Department of THE AMERICAN CITY will be glad to hear from readers who wish to make use of this service, and to receive suggestions of subjects for future cartoons.

Map-Making for Zoning by Civics Pupils

By Eva Guild Osgood

Chairman, Planning Board, Melrose, Mass.

FOR the first time in the history of city planning, the students of a public school prepared a "present use" map of the city as a part of their study of civics, receiving credits for their work, as a part of their regular study.

Melrose, a residential city of 20,000 inhabitants, was menaced by a development which had been going on for a period of years in nearby-cities. Many citizens from these cities had come to Melrose to escape the intensive two- and three-family housing situation.

The city government asked the Planning Board to prepare a zoning ordinance without delay. The municipal officials were in doubt, however, about the advisability of having one-family districts. A "present use" map was needed to prove that Melrose was essentially a one-family city. The cost of a professional survey was felt to be prohibitive.

In this dilemma the Chairman thought of the potentiality for civic service in the pupils of the civics classes, coming as they did from every part of the city. Believing that real civic work would increase their interest in civics, confident that the average boy or girl would rise to the responsibility and take pride in working for the city, she approached the principal with a plan. He thought the idea feasible, the civics teacher was enthusiastic, and the work began. Five classes, 125 pupils in all, ranging from 14 to 16 years of age, did the work.

Blazing a new trail in map-making taxed the ingenuity of the Chairman, the teacher and the pupils. The official city map was too small and the modern insurance maps too large for the purpose. Finally, the Chairman found some insurance maps over twenty years old of suitable scale.

The pupils traced the pages, 16 x 20 inches, correcting where necessary, matched them together like a patchwork quilt, and retraced them on a large sheet of tracing paper. Economy suggested blueprint paper without thought of the effectiveness of the color.

The elaborate symbol card of the Boston Planning Board, some sheets of gummed paper—red, green, yellow, brown and black—and a book containing a miniature colored copy of a "present use" map, were given to the students with the responsibility of choosing their own symbols, both as to color and shape. They rose to the occasion wonderfully.

Meanwhile, small portions of the official map had been given out, each pupil, if possible, having his own familiar territory. The data of single- and multiple-family houses, business buildings, garages, barns, sheds and hen-houses were compiled, and the actual work of map-making began.

Tiny green rectangles were cut from the gummed paper to represent single-family use, while red served for two-family, with a figure in white ink to indicate multiple use. Segments of small red seals served for garages, the number of points indicating the number of compartments. Stars cut in different shapes indicated sheds and hen-houses, yellow showed business buildings, while black represented public buildings. The old ladies' home had a separate symbol.

For the first time in the history of the

Woman Blazes New Trail in Map-Making

The author of this article, who is believed to be the only woman chairman of a city planning board in the United States, has described, for the benefit of small cities, the unique method which she devised for securing, through the public schools, valuable aid and publicity for zoning. Not the least beneficial result of blazing this new trail in map-making was the fact that the whole city was in such a happy frame of mind over the novelty of the idea and so proud of the students' work that there was practically no opposition to the zoning ordinance when adopted.

In her letter transmitting the article, Mrs. Osgood emphasizes the fact that, unless the chairman is willing personally to supervise the work and to meet emergencies as they arise from day to day, the undertaking is not likely to succeed. She also says, "I am convinced that proper publicity is of vital importance in zoning. The proposal to take away century-old individual rights for the benefit of the community must be made with discretion."

school, students had to be driven out of the building at six o'clock by the principal. They realized that the work must be done quickly and worked early and late upon it. All work was done out of school hours.

The result was two amazingly brilliant maps, about 5 by 6 feet, each showing the different uses so plainly that there could be no mistaking them, and proving by the predominance of green that Melrose was a one-family city. The cost to the city was $6.50!

The enthusiasm of the pupils led them to preach zoning to their elders, which gave a publicity of wonderful value. During the progress of the work the local League of Women Voters offered a prize for the civics classes for the best essay on "Why Melrose Should Be Zoned." Over one hundred students competed. Dr. Provandie, the Mayor, who was enthusiastic over the work, offered prizes to the history classes, numbering 400, for essays on "City Planning for Melrose."

The maps were exhibited and prizes awarded by the Mayor at a "Home Beautiful" fair, giving further publicity. The prize-winning essays were printed in the local papers. The newspapers also featured the unique plan in other ways. Pictures were taken of the students, maps, teacher and Chairman, and published in the Sunday newspaper.

The work was begun in November. The maps were ready for the public hearings the first of January. The ordinance was placed in the hands of the Board of Aldermen in February and became a law on March 18, 1924.

One Massachusetts city is working on a similar map at present and others are planning to do so in the near future.

Activities for the Public Safety Division of a Chamber of Commerce

By George C. Lehmann

General Manager, Buffalo Chamber of Commerce

IN the Public Safety Division of a Chamber of Commerce there would be a Traffic Board, a School Committee, and a Citizens' Safe Traffic Committee.

The Traffic Board would act in an advisory capacity to the head of the city's Police Department. Its membership would include representatives of the Chamber of Commerce, the Association of Automobile Dealers, the Automobile Club, the Engineering Society, the Truckmen's Organization, the City Planning Committee, the Terminal Committee of the City, the hotel men, the theaters, the taxicab interests, the Police Department, the Fire Department, the County Engineer, a lawyer and such other representatives of constituted agencies as may suggest themselves, as well as several other prominent business and professional men.

This board would give consideration to all traffic problems, such as one-way streets, fire streets, parking regulations, etc. It would formulate its recommendations and transmit them to the proper authorities for adoption. Of course it would hold stated meetings.

One of the most effective tasks which such a Traffic Board could perform would be the preparation of:

(a) Maps showing traffic movement along main arteries and subsidiary channels in order that traffic distribution and control may be made effective.

(b) Spot-maps of the occurrence of traffic accidents, so that local centers of hazard may be identified. Also,

(c) The making of an intensive study of such local centers, graphically, with proper solutions indicated.

The School Committee would be composed of principals of public schools, as well as parochial schools. Its plan of work would include the issuance of leaflets for the teachers' use in the city schools as a regular part of the educational program. Safety patrols would be formed from the children of the higher grades and properly organized so that each patrol would have a chief, a captain, lieutenants and patrolmen. They would wear some sort of badge and be provided with flags for use at crossings near the schools. The flags would be used under the direction of the police officer regulating traffic at the crossings. The members of the school patrol would keep the children from crossing the streets until signaled by the officer. This committee also would arrange mass meetings of school children in local halls, at which time members of the police and fire departments could deliver safety talks and educational films could be shown.

Inspections for fire hazards and mechanical dangers would be made in public schools generally, but especially in the technical and vocational schools.

In its purely humanitarian appeal, I doubt if there is any other single activity in which a chamber of commerce can engage to which the public gives its approbation more readily than to work carried on to safeguard human life. It is instinctive in humanity to protect oneself. Undoubtedly, the most powerful impulse in primitive man was the protection of himself and his family. That this instinct has not extended so as to include whole communities—the nation itself, if you please—perhaps is due to the too rapid development of civilization. Nevertheless, public attention always can be riveted upon efforts put forth for the saving of life and property.

—From a paper on "Safety—the Chamber of Commerce Opportunity," read at the annual convention of the National Association of Commercial Organization Secretaries, October, 1924. The author covered also the work of an Industrial Safety Division.

The Cost of Public Health

THE feelings of Dr. Fred Converse, County Health Officer, had been ruffled that morning. Bob Cator, the village gossip, had told him that Jackson Holly, a farmer whose place was near-by, had been denouncing him. "He says," went on Bob, "that you and that nurse, Miss Gordon, are nice folks, but that it ain't fair to tax hard-working farmers to let you lie 'round and do nothing."

Dr. Converse had blinked, but had answered laughingly. "Holly's a good man," he agreed. "He speaks right out and gives you a chance to answer him. If you see him before I do, Bob, you ask him to drop into my office some day with his account book, and I'll try to astonish him."

Investment—Not Extravagance

This story, prepared by the U. S. Public Health Service, will be useful, it is believed, for reprinting by local health departments as a means of impressing the voters with the fact that modern public health work is not an extravagant fad, but an investment which pays big dividends.

An hour later, when the doctor reached his office, he went over his records to see just what the county health service had done for Mr. Holly; and he was amazed. "Great Scott!" he exclaimed. "I knew our health work came cheap; but I never dreamed that—"

He broke off as his office door opened, and jumped up to welcome Mr. Holly and half a dozen others who came in, piloted by Bob Cator, who had plainly lost no time in doing as the doctor had asked.

When they were seated, Mr. Holly cleared his throat. "Got your message, Doc," he said, "and came right around. Brought some folks with me as umpires!"

"Great!" Dr. Converse was delighted. His visitors were among the most influential in the county, and he had long hoped to get a chance to talk to them. "I'm mighty glad to see you all. I see you've got your account book, Mr. Holly. Now, if Bob Cator will keep score on the blackboard—Thank you, Bob!"

"Now, Mr. Holly," went on the doctor. "Let's begin by seeing what the county health service really costs you. What health tax do you pay?"

"Pay 22 cents per $1,000 valuation. My valuation's $8,000; makes my health tax $1.76 a year. Don't seem much to city folks, maybe; but it's only one thing out of a lot; and it all counts up when a man's got to earn his living in the blazing sun."

"Quite true. And whether it's much or little, you're entitled to know what it's spent for" . . . "Bob! Put down Cost on the board and below it write, Health Tax . . . $1.76. Any other costs, Mr. Holly?"

"Lots of them." Mr. Holly opened his account book. "Here's the cost of those danged window screens you fellows persuaded the county to make us buy to keep out mosquitoes and that weren't a darned bit of use to us. That's an expense, all right! Course, you fellows didn't get the money yourselves, but—"

"All right. What did your screens cost?"

"$14.25. That's for the house and for the annex where the farm help lived."

"All right! Put it down, Bob! To health investment, $14.25. Of course, Mr. Holly, you know the county spent as much more in oiling and draining the ponds where the mosquitoes breed. That's something you got for your health tax. But never mind! Tell me: How much did you spend for malaria sickness—medicines and doctor's bills—for the 12 months before you put in the screens?"

Mr. Holly thumbed his book. "Bout $20 for doctoring and $2 for quinine," he decided.

"All right. Now, how much have you paid for the same things during each of the two years since you put the screens in. It's been just about two years, hasn't it?"

"Ye-es. I reckon so. But—" Mr. Holly frowned and searched his book. "Paid mighty little," he admitted. "We ain't had any malaria worth speaking about these two years. The mosquitoes just didn't come 'round. And so, of course, the screens didn't do us a bit of good."

"Didn't they? The mosquitoes came around all right in Atla County, right next door; didn't they?"

"Well—maybe they did, the first year, anyhow! Last year they didn't come anything to speak of."

"Wasn't that because Atla County screened and oiled and drained a year later than this county did? Isn't it fair to estimate that you would have had to pay at least another $22 each year if you hadn't put in those screens. Atla County people paid at least that much

Seems to me that your health investment of $14.25 has saved you two times $22—$44 or $29.75 net. And you've got your screens still. Shall we ask Bob to write down: Profit, $29.75?"

Holly hesitated. But the umpires chuckled and he agreed hastily. "Yes! Put her down, Doc," he said. "Guess that's all about those screens, ain't it?"

"Not quite. How many days' work did you and your men lose from malaria in the year before you put in the screens?"

Mr. Holly frowned. "Oh! Five or six days, maybe," he said. "But what's that got to do with it?"

"Everything. You paid the men, didn't you?—and lost five or six days, because they were too sick to work; so you lost the money. And you were down with malaria yourself that summer, weren't you? Lost some time, didn't you? And even when you and the men were better, you weren't up to par so you could do a real full day's work, were you? And in the next two years you didn't lose anything like so much—from malaria? The screens, etc., saved you the difference between what you lost the first year and what you lost in each of the last two years."

Holly scratched his head. "Well, if you want to count that, I s'pose you've got a right to do it," he said. "Say, Bob! I reckon you'd better chalk down about $25 dollars profit from saved wages due to those blamed screens. Now, what's next, Doctor?"

"Smallpox!"

"Smallpox? There ain't been any smallpox here since I came, except, of course, what that Stone family brought when they refugeed here from the west end of the state and sent their two children to school, till they broke out with it two days later. But it didn't spread."

"Why didn't it spread?"

"Well, I don't know. I don't hold much with vaccination; but I reckon it was because most everybody here, especially the school children, got vaccinated right away. But what—"

"Who vaccinated your family?"

Holly hesitated. "Well," he said, finally, "Mandy—Mandy's my wife, you know—Mandy went wild when she heard about the Stone children and she grabbed two of our children, all she could get her hands on right then, and rushed them to Dr. Morford's and had him vaccinate them. If she'd waited half an hour, we could have brought them to you and got the six of us fixed up for nothing." Holly turned resignedly to the blackboard. "Bob," he said, "enter up $4 to saving on vaccinations."

The umpires applauded freely, and Mr. Holly joined in, though somewhat ruefully.

Then Dr. Converse resumed. "Now about the public health nurse," he remarked. "Being a mere man, Mr. Holly, you probably don't remember how many visits Miss Gordon made to your place the first year you were here. But I see Mrs. Cator at the back of the room; and I'll ask her to tell us all about Miss Gordon's visits to her when her baby was born last spring and when her other girl was ill the fall before that. How much were those visits worth, Mrs. Cator?"

Mrs. Cator stood up. Twice she tried to speak before the words came. Then—

"I don't know," she burst out. "You ask Bob Cator how much his wife and children are worth to him. That'll be just what those visits were worth. I ain't saying anything against Dr. Morford; he's a mighty good doctor, I reckon. But he's just a man, and I lived a long way from everywhere and—and—My God! When I remember that time—It was Miss Gordon's coming that pulled us through. It was having another woman around—a woman that knew what to do and that did it without making any fuss about it. And—and—" Mrs. Cator swung around to her husband. "Bob Cator, if you been saying anything against Miss Gordon, or against Dr. Converse either, I'll—I'll—." Helplessly, she dropped into her chair.

When the umpires had gotten over their somewhat hysterical laughter, Dr. Converse resumed:

"I'll come back to health nursing after a little," he promised. "But just now I want to take up another subject." He turned to Holly. "Mr. Holly," he said, "I hope I won't offend you by what I'm going to ask. You'll understand why I do it after a little while. Won't you tell us how your children stood at school the first year after you came here?"

Mr. Holly flushed hotly. "Get offended?" he exclaimed. "No! I won't get offended. But I'm hurt a lot. It wasn't the fault of those little tykes that they didn't stand high. All four of them was sick when we come down here; and it wasn't to be expected that they'd do much—"

"Exactly. Where you came from you didn't have any malaria problem. And unless you wished you didn't have to put in any screens to keep out the flies that carried filth on their feet. Two of your children had typhoid fever in Tunlaw County, didn't they?

Got it from flies or from an infected well, probably. None of them had it down here, did they? Do you know why? It was because I, as health officer, made Jones, who sold you the farm, fill in his well because it was a cesspool of pollution and dysentery and typhoid that had cost him the lives of his wife and his only child. I made him dig another in a better place by threatening to prevent his selling his farm to anybody until he did. That's why you haven't had any bills to pay for typhoid or dysentery or maybe for funerals. Those mosquito screens that keep out flies and the sanitary privy that kept the flies from getting pollution on their feet to be carried to your food saved your family. Can you calculate how much all this service was worth to you?"

Mr. Holly shook his head. "No, I can't," he admitted. "But I know it's worth a lot."

"Then try to calculate this: When you came here your two eldest boys had hookworm disease; they probably got it when they visited their uncle down in the hookworm belt. One of them and your girl had adenoids that were deforming their faces and interfering with their breathing and thinking. Your girl also had a catarrh that made her so deaf that she couldn't hear half the teacher said; and so she got the credit for being dull and stupid—"

"Dang you!" Holly was on his feet. "Maybe that's true, but I ain't going to listen to any more of it, I just—"

"Then listen to this, Mr. Holly. Why is it that your children are now among the brightest and healthiest and finest children in the school? I'll tell you why. It's because the county health service cured the two that had hookworm and gave them a chance to get well and strong. And it's because Miss Gordon nearly wore herself out going to your house the first winter you were here and urging Mrs. Holly to persuade you to have the adenoids that were ruining two of your children taken out at our nose and throat clinic; and persuading you direct to take little May to town to a surgeon to have her hearing attended to. She isn't considered stupid now, is she? I'll tell the world she isn't. Consider what those children are now and what they were then; and tell me what the county health service has done for you that's worth while."

"Done for me?" Holly was on his feet once more. "It's done everything for me. It's made me attend to things that I was too big a fool to attend to of my own accord. It's sent you here to give me advice for—for—Good Lord!—for $1.76 a year. Think of it: $1.76 a year! It's given my boys health and strength and a chance to be something. And it's given me back my little May, as bright and rosy as she was when she was a baby. Doctor, you needn't calculate any more. Just charge me up with a million dollars' worth of health—price $1.76."

Abandonment of Plain-Clothes Traffic Officers Predicted

COMPLETE abandonment of the use of plain-clothes officers in the work of bringing automobile speeders to justice within the next year is predicted by the American Automobile Association in a special dispatch sent to all affiliated motor clubs throughout the country from its national headquarters in Washington, D. C.

This prediction is based upon an exhaustive investigation of the police methods of the principal cities in this country with regard to the arrest of speeders and motor law violators. Of the 61 police chiefs consulted, the dispatch shows, only 3 reported the use of ununiformed officers in the work of catching speeders, and 5 reported a dual system whereby traffic officers were both in uniforms and in plain clothes. Of the 53 cities now using uniformed police exclusively for traffic law enforcement, 23 had at one time tried plain-clothes men and abandoned the system.

Commenting upon the facts, Thomas P. Henry, President of the A. A. A., says that, the trend of enforcement being toward uniformity, as with all automotive legislation, the secret method of arrest cannot expect to gain favor and must be discarded.

The A. A. A. has summarized the reasons for abandonment of the espionage system, as advanced by the leading police chiefs, as follows:

It has never been necessary to put out plain-clothes men to catch speeders. Detective methods are necessary only for violations which are not done in public.

Uniforms are a protection to the motoring public as well as to the police force.

The uniform has a very deterrent effect upon would-be violators.

It is more important to discourage a motor violation than to make an arrest after something has happened.

Good policing consists in maintaining order without arrests.

Espionage presupposes the motorist a criminal. It also encourages fatalities through obvious confusing of police with highwaymen and grafting constables.

"The A. A. A.," says Mr. Henry in conclusion, "believes that the few cities now using the spy system will have to abandon it presently, not merely because it has been found to be inadequate and illogical by the many other cities that have tried it, but mainly because the time is not far distant when no city will be able to enforce any plan that is out of key with the motor regulations of the country in general."

The New Sewage Treatment Works at Worcester, Mass.

By Ralph G. Lingley

Superintendent, Sewer Department, Worcester, Mass.

WORCESTER, a city of 200,000 inhabitants, is located at the head of the Blackstone River, the most highly developed river as to water-power in the United States. The second chemical precipitation sewage treatment plant in this country was constructed in Worcester in 1890, by C. A. Allen, then City Engineer. Copperas was present in the sewage as a trade waste, and lime has been the only chemical used. This plant is in use to-day and takes care of about 86 per cent of the sewage. In 1904, the first detritus chamber constructed in this country was placed in operation by Harrison P. Eddy, then Superintendent of Sewers.

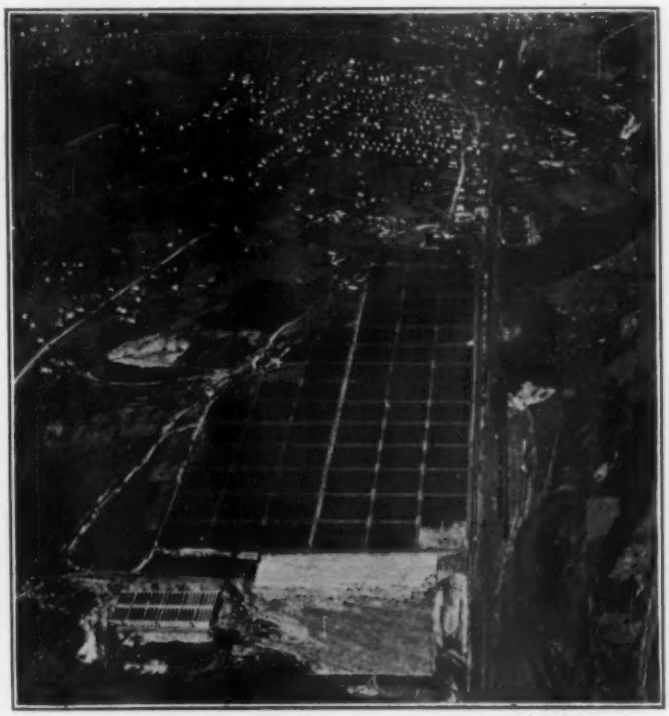
From 1899 to 1910, sand filters to the extent of 74 acres were constructed, and they are now used to treat about 14 per cent of the sewage flow, after it has passed through two settling-basins where the detention period is about 30 minutes. From 1904 to 1918 much experimental work along sewage treatment lines was carried on.

In 1919, the State Legislature enacted a law compelling the city of Worcester to construct a new sewage treatment plant to be ready for operation April 1, 1924. The time was subsequently extended to July 1, 1925. The City Government at once ordered an Imhoff tank trickling filter sewage treatment plant to be built, and it is now nearing completion.

The new plant has detritus chambers, a Venturi meter, Imhoff tanks, dosing tanks, trickling filters, secondary tanks, sludge drying beds, and a modern laboratory building. The design is based on an average daily sewage flow of 28 million gallons from a population of 275,000 in 1940. The plant is located 3.5 miles south from the center of the city and adjacent to the sand filters of the present chemical precipitation plant.

The detritus or grit chamber consists of two channels, 85 feet long and 6 feet wide, the pit depth at the inlet end being 2.5 feet and at the outlet end 4.0 feet, furnishing grit capacity of about 100 cubic yards. The design is planned for sewage flows up to 67 million gallons daily with an average velocity of flow of about 1 foot per second.

Gates are provided for draining off the top water when a chamber is to be cleaned. The inlet gate is then to be opened and sewage used to scour out the grit through a 30-inch gate onto one of the present sand filters close by. After drying out, the material can be scraped or carted to near-by spoil areas. It is expected that frequent cleaning will minimize any offensive odors. The design is such that cleaning may be done by a crane with a



AN AERIAL VIEW OF THE WORCESTER SEWAGE WORKS

This picture shows the small space occupied by the new plant shown in the lower left-hand corner as compared with the old plant

clam-shell bucket attached to it.

From the detritus chambers, the sewage will flow through 1,100 feet of inverted siphon, thence through the Venturi meter to the Imhoff tanks.

There are twelve Imhoff tanks, each 60 by 90 feet in plan, with a water depth of 31 feet; each tank has four sedimentation compartments, the slope of the bottom being 1.5 on 1.0, and all together give a 2.5 hours' detention period based on 28 million gallons daily. Open channels are used throughout, and provision is made for distributing and reversing the flow of sewage. Scum boards are also provided.

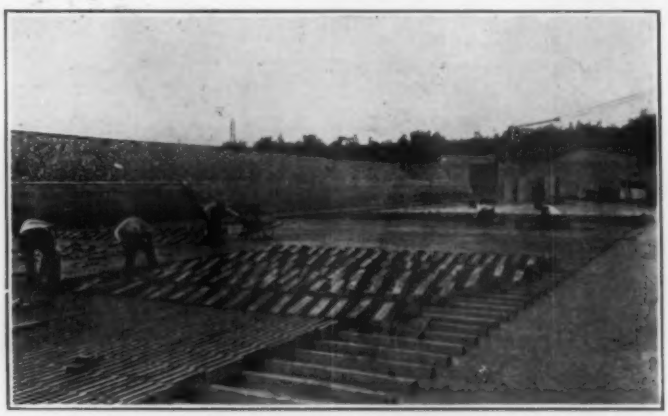
Each tank has five gas vents extending the length of the tank, the middle three being 36 inches wide, and the outside two each 18 inches wide. The gas vent area is about 21 per cent of the tank area.

There are six sludge hoppers in each tank, 30 feet square with a bottom slope of 1 on 2. The depth of sludge storage below a point 24 inches from the 8-inch slot is about 17.5 feet, sufficient for a period of about five months. The sludge storage capacity is approximately 5.9 million gallons, representing about 3 cubic feet per capita. Drains are provided for drawing the tanks down to the top of the sludge hoppers. Sludge pipes, 8 inches in diameter, will remove the sludge under head to adjacent sludge beds which will be constructed in the present sand filter area. Perforated water pipes will be placed on each slope for agitation of the sludge.

The dosing tanks are in four units, each having two compartments, 30 feet square, with twin alternating 36-inch siphons. Each unit doses one-fourth of the filter area, or 3.5 acres, under variable effective head of 7 feet to 1 foot. One side of each compartment is so constructed as to assist in giving uniform distribution of sewage upon the filter. Each compartment has an approximate capacity of 36,500 gallons and, at the 28 million gallons rate of sewage flow, provides filter dosing and resting periods of three minutes each. At the maximum rate of sewage flow the dosing tanks will function, but there will be practically no rest period of the filter. The channels to the dosing tanks have overflow weirs and are so arranged that the Imhoff tank effluent can be discharged directly into the river.

The trickling filter, 752.5 feet by 792.0 feet in area, or 14 acres, is divided into two units and has 10 feet depth of crushed granite and trap rock, screened through a 3-inch ring and held on a 1¼-inch ring. Each quarter-section of the filter has a concrete main distributor decreasing from 54 to 24 inches in diameter followed by a cast iron section decreasing from 20 to 12 inches in diameter. From this main distributor are 8-inch cast iron laterals reducing in size to 6 inches. These distribution pipes are to be laid in the top stone, spaced so that the nozzles are staggered and 15 feet apart.

The concrete floor, sloping to the main drains, has concrete ridges, 15 inches on centers, upon which are set precast cement mortar beams on edge, the beams being 16 x 4 x 1½ inches. These beams form a grid floor above the bottom and have open or air space of 43 per cent. Each half of the filter has two main drains which collect from 100 feet of floor on either side and carry the effluent to the secondary sedimentation tanks. Inspection galleries are provided over each drain and at the ridges halfway between the drains. The filter is enclosed by a concrete wall and either half can be flooded if desired. Treating an average daily sewage flow of 28 million gallons, the rate of operation will be two million gallons per acre per day.



CONSTRUCTION VIEW OF FLOOR OF TRICKLING FILTER AND INSPECTION GALLERY

There are four secondary sedimentation tanks, one for each quarter of the filter. Each tank is 60 feet by 120 feet, and 15 feet water depth, the direction of flow being across the short dimension. Each tank bottom has eight hoppers, 30 feet square and 7 feet deep. Sludge pipes, 8 inches in diameter, are provided, and the sludge will be pumped to the Imhoff tanks or directly to the sludge drying beds. Based on the 28 million gallons daily rate of sewage flow, the de-

CONSTRUCTION VIEW OF SECONDARY SETTLING TANKS FOR NEW WORCESTER, MASS., PLANT

tention period is 1.5 hours.

The elevations of the sludge discharge pipe from the Imhoff tanks and the sand filters of the present plant are such that about 18 acres of the filters are available for sludge drying beds by piping to them and dividing into smaller units.

All buildings will be constructed of similar materials; shrubbery and drives will be provided and the grounds kept in as attractive condition as possible.

ACKNOWLEDGMENT.—From a paper read before the American Society for Municipal Improvements, at Boston, Mass.

National Association of State Chambers of Commerce Organized

AT a meeting of Presidents and Secretaries of State Chambers of Commerce, held at Pittsburgh on October 9, it was decided to effect a permanent organization, and Stanley H. Bullard, President of the Connecticut Chamber of Commerce, was chosen as its President, and George B. Chandler of Hartford, Secretary of the Connecticut Chamber, as its Secretary.

The purposes of the new organization are, first, to cause to be prepared and assembled a fund of literature on the best state chamber of commerce practice, comparable with the matter of a similar nature bearing on local chambers. In some states where an attempt has been made to organize a state chamber, the promoters have floundered and failed because of the absence of any text-book or guiding principles. A second purpose of the organization is to carry on a campaign of education in those states where there are no state chambers, or in which the organizations have been wrongly started and are struggling for existence.

There never has been a time when there was a greater call for state-wide organization combining all business groups than now. Many wise students of American affairs are apprehensive of the trend toward centralization in the hands of the Federal Government, and a resulting loss of the historic balance between nation, state and municipality. Moreover, as has been repeatedly pointed out, an overwhelming majority of the laws affecting personal and business relations are a state enactment or state execution. The state is still the most vital unit in our American system of government, and the Federal and local governments possess only such powers as have been delegated to them. All undelegated powers reside in the states.

To combat the short-sighted selfishness of certain organizations which fear the encroachment of state chambers of commerce, to dispel misunderstanding, and ultimately to extend the state chamber of commerce movement throughout the country, is the ambition of the founders of this new organization.

Now in Preparation—The 1925 Edition of The American Municipal Yearbook,

THE MUNICIPAL INDEX

A reference work of great practical value to municipal officials, civic organizations, educators, public libraries, and others having to do with municipal and county improvements.

The seventeen sections of the 1924 edition contain more than 148,000 words of text matter, exclusive of 261 pages of abridged catalogs. There are also more than 9,500 words descriptive of the activities and services of 114 national organizations and 25 Government bureaus serving municipalities. The bibliographies contain more than 1,100 entries; the alphabetical list of subjects, 675 entries; and the classified list of products and services, 943 entries under 375 headings.

The American City Magazine, 443 Fourth Avenue, New York

Ideas for Christmas Observances by Municipalities

WITH the celebration of another Christmas season now but a few weeks distant, no doubt a greater number of cities than ever before are planning to bring together all their citizens for a truly community-wide festival. For those who are planning the programs, perhaps the following brief suggestions, which have come to THE AMERICAN CITY from various sources, may be of some help.

While the tree, hung with lights and tipped with the symbolic star, has become the center of most celebrations, its effect will be enhanced if there can be some subsidiary decorations in the surrounding neighborhood, carried out in the season's colors of green, red, and white. The local merchants might combine their resources for some general scheme of decoration for the business district. Cities with foreign populations might adopt the plan of spreading banners, bearing the words "Merry Christmas," or "Welcome," written in various languages, across the streets leading to the tree. Several cities have planted permanent community Christmas trees. Atlanta plants a tree each year in one of its parks, forming a group of trees as a permanent setting for its Christmas festivals. Milwaukee builds a giant tree out of about 400 average-sized trees, placed in sockets on a 75-foot telephone pole.

Hand in hand with the community Christmas tree has of course come the revival of the old custom of caroling. In addition to the singing of carols by the assembled crowds around the tree, many cities have organized groups of "waits" who sing along specified routes through the city streets. A widely adopted custom is that of announcing that the carolers will sing only where candles or other lights are displayed in the windows as a sign of welcome. On Christmas Eve in one city a band of carolers sang while trains were

A CHRISTMAS WINDOW EXHIBIT OF THE CIVIC CLUB OF ALLEGHENY COUNTY, PITTSBURGH, PA.
The "Hope Chest" contained more than a hundred boxes, presented by a leading department store, wrapped ready for use. Two of the boys from the Junior Civic Club marked them

IF IT'S AN "OLD-FASHIONED" WINTER, AN ICE CARNIVAL, SUCH AS THIS ONE IN NEWBURYPORT, MASS., WOULD MAKE AN EXCELLENT FEATURE FOR THE CHRISTMAS HOLIDAY SEASON

stopped at the railroad station, and a delegation boarded the trains and presented each passenger with a greeting card from the community. The number of American cities that have adopted the custom of outdoor caroling increased from 30 in 1918 to 1,285 in 1923.*

For the program of entertainment at the tree, material for many appropriate plays, pageants, tableaux, etc., can easily be obtained. But as outdoor features are often spoiled by inclement weather, it is well not to overlook the possibilities of indoor celebrations, also. In large cities, Christmas joy might be spread by holding several celebrations instead of one. In cities with poor districts, the saving in car-fare to parents with large families is a consideration.

In addition to the tree and its accompanying entertainment program, there are many ways in which the Christmas spirit may be shown. For instance, some cities make it easier for mothers to do their shopping at this time by arranging for the care of babies and small children at a temporary nursery. Last year the Flint Chamber of Commerce maintained a wrapping and mailing station for packages, and provided the paper, pen and ink, and small cards for enclosure. The Postmaster gladly furnished men to handle the weighing, selling of stamps, etc. Huge greeting cards, such as the one used in Boston last year, may be erected at railroad stations to welcome the stranger within the gates. In one community, a great municipal stocking filled with gifts brought joy to many needy children. In another community the warmth of the Christmas spirit was spread by a fire burning for a week before Christmas in a large community fireplace built out-of-doors by the Board of Trade.

Whatever form the celebrations may take, there should be no one in the community who does not know that it is Christmas and that his townsmen want him to share in the Yuletide spirit of cheer and good-will.

---

* These statistics are embodied in "Christmas Caroling in 1923," a survey issued by the National Bureau for the Advancement of Music, 45 West 45th Street, New York City.

The Playground and Recreation Association of America, 315 Fourth Avenue, New York City, has prepared, in mimeographed form, the following material: A set of four Christmas programs, 50 cents; "The Perfect Gift," by Elizabeth H. Hanley, a community Christmas pageant, 25 cents; "A Miracle of Christmas," by Faith Van Valkenburg Vilas, a one-act play, 25 cents; "Seven Gifts," by Stuart Walker, a Christmas pantomime, 15 cents; "The Community Christmas Tree," by Grace Humphrey, a description with illustrations of the first Community Christmas Tree celebration held in New York, 10 cents; "Christmas Carols," the words of ten favorite carols, 70 cents per hundred, $7 per thousand, plus postage.

The Semi-Annual Index to THE AMERICAN CITY, July-December, 1924, will be found immediately preceding the back cover of this issue.

Zoning Notes

Prepared by Frank B. Williams

Author of "The Law of City Planning and Zoning"

From data collected by the Zoning Committee of New York (233 Broadway), and from other sources

For further information, Mr. Williams may be addressed in care of

THE AMERICAN CITY MAGAZINE, 443 Fourth Avenue, New York

Recent Zoning Decisions

MARYLAND.—*Green and Cordell v. Mayor, City Council and Board of Zoning Appeals of Baltimore City and Benjamin Love; City Court of Baltimore.*—The Board of Zoning Appeals, in variation of the strict letter of the ordinance, ordered the issuance of a permit for a tailoring shop in a residential use district. The proposed shop will be next door to an existing non-conforming grocery and directly across the street from an open railroad cut. The applicant carries on business in a building to be torn down. The Board was of opinion that it would be a hardship for the applicant to be driven from the neighborhood; that the conditions in the neighborhood justified the variance; that the value of property in the neighborhood would not be depreciated; nor the fire hazard increased. The City Court, with a jury, affirmed the decision of the Board of Zoning Appeals.

MASSACHUSETTS.—*Inspector of Buildings of Lowell v. Stoklosa, Supreme Court, October* 18, 1924.—Suit in equity to restrain the defendant from erecting a store in violation of an ordinance dividing the city into residential and business zones. The ordinance was passed under a statute enacted by virtue of an amendment of the constitution of the state. *Held,* adopting the opinion in *Opinion of Justices,* 234 Mass. 597, that the act does not violate either the constitution of Massachusetts or that of the United States; and that the constiutional amendment authorizing the statute was in no respect in contravention of the Constitution of the United States. The ordinance defined as a building district lands fronting upon each section of a street between the boundary lines of each two adjacent intercepting streets, etc. Any such district in which "not less than one-half the ground floor frontage of both the district and the frontage on the other side of the street immediately opposite said district are . . . . devoted to business or industry," etc., shall be a business district; other districts shall be residence districts. Existing uses may continue. Buildings in a residence district may be erected or altered for business or industry only on application accompanied by the consents of owners of three-fourths of the frontage used for other than business purposes of the district, opposite it, back of it, or within a certain distance on each side of it; provided that the City Council after public hearing shall so order. *Held,* that the ordinance did not transcend the statute. Every intendment is to be made in favor of the lawfulness of the exercise of municipal power under the police power; and it is not in the province of the courts to interfere except in clear cases. The provision making local consents a prerequisite to action by the city authorities is lawful.

Brett v. Lyon, Building Commissioner of Brookline, Supreme Court, October 18, 1924.—Brookline, by amendment of its zoning ordinance, made after some work had been done on two-family houses in a certain area, made that area a one-family house district. *Held,* that such districts may lawfully be created under the police power. Such regulations may be regarded as preventive of fire, or promoting the public health and morality. "The question to be decided is not whether we approve such a by-law. It is whether we can pronounce it an unreasonable exercise of power having no rational relation to the public safety, public health or public morals. We do not see our way clear to do that."

The petitioners have no special immunity because permits were issued to them. They had begun work under the permits but it had not gone far enough to give them a vested right against a change in the by-law by the law-making power. When acted on, such permits cannot be revoked by a licensing board except by special power to that end or a change in legislation, like the change in by-laws in this case.

In accord on the second point: *Bamel v. Building Commissioner of Brookline, Supreme Court, October* 18, 1924.

Spector v. Building Inspector of Milton, Supreme Court, October 18, 1924.—Mandamus to compel the issuance of a permit for the erection

A Notable Zoning Event

The recent decision by the highest court in Massachusetts sustaining the constitutionality of zoning in the four cases mentioned on this page, is a notable zoning event. It will be remembered that Massachusetts has passed a constitutional amendment authorizing zoning. These decisions are precedents, however, in the other states of this country; for the provisions under which the validity of zoning statutes can be challenged are, substantially, the same in the various state constitutions and the Constitution of the United States; and the Massachusetts Court sustained the law and the Massachusetts amendment, under the United States Constitution. The Court (in Inspector of Buildings of Lowell v. Stoklosa), reviews the cases on the subject, saying of some of them which are not in favor of zoning, "Other decisions having a contrary appearance may rest upon other grounds," and of those clearly contra, "we are not inclined to follow them."

of stores. Before a zoning ordinance was adopted, the petitioner bought the land in question to erect the stores thereon. He filed plans for twelve stories, and later filed plans changing them to eleven-story buildings.

In order to prevent the erection of these stores, the Selectmen directed the Inspector to delay the issuance and delivery of the permit, meanwhile preparing a zoning by-law and presenting it to a town meeting, which passed it. The by-law forbids stores in the district in which petitioner's land was situated.

Held, that the zoning ordinance was suited to a town of the character of Milton, the district in question was residential in character, and the fact that the petitioner's land would be worth more for stores did not invalidate the provision. "Every exercise of the police power in respect to the use of land is likely to affect adversely the property interests of somebody. That caused to the petitioner by the zoning by-law is far less in degree than in Fisher v. St. Louis, 194 U. S. 361" (citing other cases also).

The fact that the application for a permit was filed before the by-law was enacted, did not make it inoperative as to the applicant. The filing of the application gave him no vested rights.

The disingenuous conduct of the respondent and the other officials cannot stand in the way of the common good of the people, as manifested by their vote.

NEW YORK.—*Bartsch v. Rahonetti, before Benedict, J., Supreme Court, Kings County, October 23, 1924.*—The excavation and carting away of sand, and the erection of temporary structures in pursuance of the work, in a residential district, is not violative of the New York City zoning resolution.

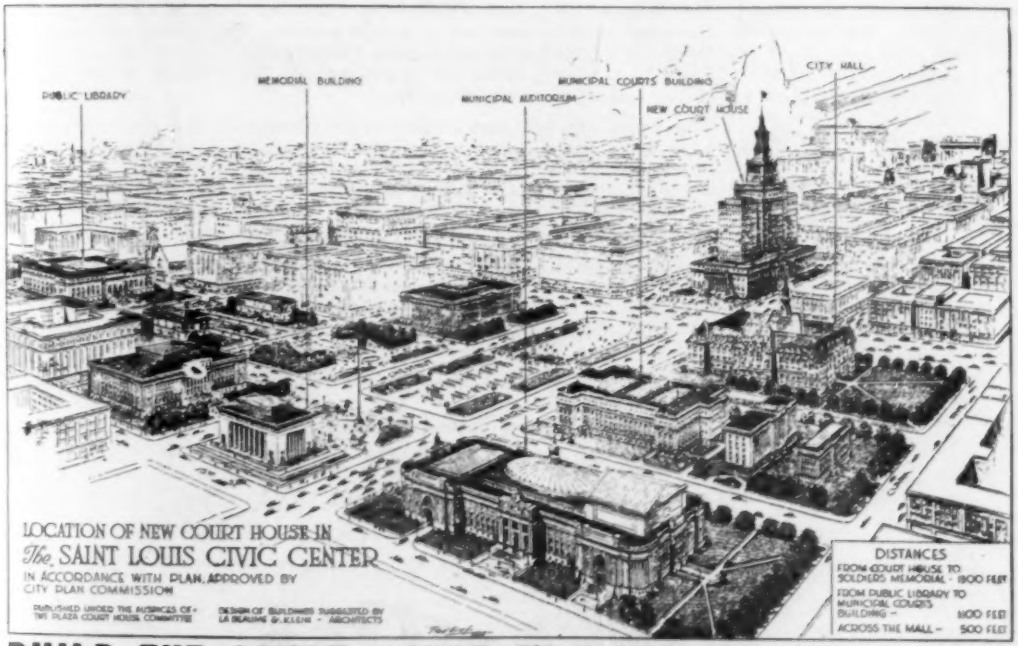
..Headley v. Fennell, Superintendent of Buildings of City of Rochester, Supreme Court, Monroe County, October 10, 1924.—The provision of the Rochester zoning ordinance, creating one-family residential districts from which apartment houses are excluded, is valid.

State ex rel. Barker v. Boellger, Chairman, Supreme Court, Westchester County, July 25, 1924.—The Board of Appeals had power to allow the erection of a public garage on a lot in a business district, extending twenty-five feet into a residential district, with an entrance from the courtyard of an apartment house. The use of such a door saves the necessity of the automobile's passing both in and out every time a passenger goes to or leaves the building. The permit, however, should be on condition that no person except an occupant of the apartment house use the door for ingress or egress with an automobile.

St. Louis Backs Up Its City Plan Commission

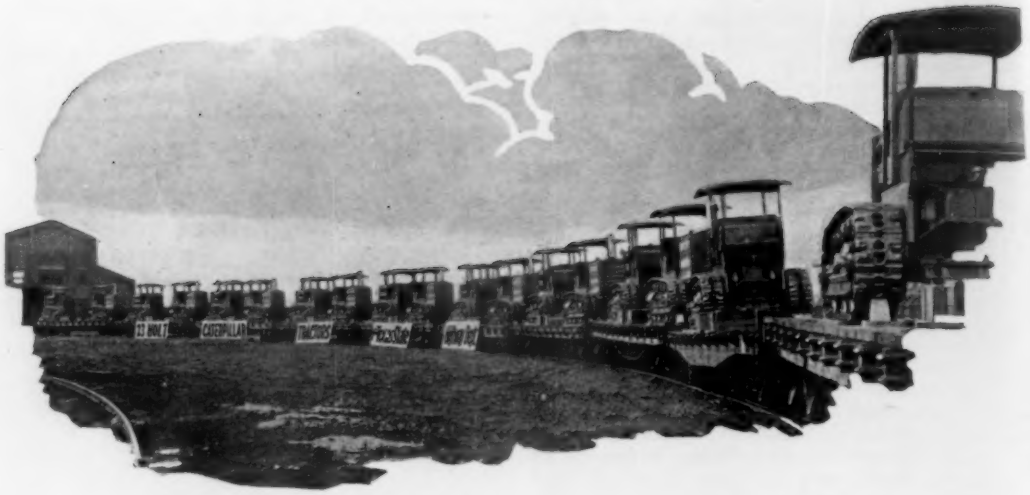
BY a decisive majority of over 35,000, the citizens of St. Louis at the recent election upheld the ordinance previously passed by the Board of Aldermen for the building of a new court-house on Twelfth Street, as included in the plans for a municipal plaza and public building group set forth by the City Plan Commission.

Since the passage of the bond issue for this


PUBLIC LIBRARY
MEMORIAL BUILDING
MUNICIPAL AUDITORIUM
MUNICIPAL COURTS BUILDING
NEW COURT HOUSE
CITY HALL
LOCATION OF NEW COURT HOUSE IN
The SAINT LOUIS CIVIC CENTER
IN ACCORDANCE WITH PLAN APPROVED BY
CITY PLAN COMMISSION
DISTANCES
FROM COURT HOUSE TO SOLDIERS MEMORIAL - 1800 FEET
FROM PUBLIC LIBRARY TO MUNICIPAL COURTS BUILDING - 1100 FEET
ACROSS THE MALL - 500 FEET

BUILD THE COURT HOUSE NOW, ON THE PLAZA!

VOTE YES SCRATCH NO PROPOSITION 10



Texas buys a train load

Full Force Feed Oiling System

In "Caterpillar" motors full force feed lubricating system is used. Oil is delivered under pressure to the main bearings, thence through drilled passages in the crankshaft to the connecting rod bearings. The grooves in the connecting rod bearings are tapped by a tube running up to the piston pin bearing, thus delivering oil under pressure to all working parts. The "Caterpillar" can run continuously in extreme position, forward, backward or sideways with lubrication absolutely dependable at all times.

Inaugurating its program for maintaining some 18,000 miles of roads, the State Highway Department of Texas selected "Caterpillar" Tractors for the heaviest grading, maintenance and hauling work. Twenty-three 10-ton "Caterpillars"—a complete train load—were recently purchased; one of the largest and certainly the most important order for tractors ever placed in Texas.

The "Caterpillar" has had a mighty part in the development of this great state; it was the logical choice for such public responsibilities. Throughout Texas, county after county, city after city has found "The Nation's Roadmaker" the most efficient power for road making and other public works. On numerous industrial and agricultural operations, "Caterpillars" have been called upon to perform tasks too important or too difficult to entrust to any other machine or method.

The State officials and engineers in charge of this department have been highly commended by the taxpayers and citizens of every class, for their foresight in assigning "Caterpillars" to the task of getting the most work done with the greatest economy of road funds.

For snow removal, earth moving contracts, engineering projects and other public works—wherever there is need for the utmost in tractive power and endurance—the "Caterpillar" has no real competitor. The 2-ton is ideal for all lighter hauling. The 5-ton is an undisputed leader in the medium power class. The 10-ton is in a class by itself in the heavy-duty field.

See our exhibit at the Good Roads Show, Chicago, Jan. 5 to 10.

The Nation's Road Maker

There is but one "Caterpillar"—Holt builds it.

THE HOLT MANUFACTURING CO., Inc.
PEORIA, ILLINOIS STOCKTON, CALIF.

***Eastern Division:* 250 W. 54th Street, New York**

CATERPILLAR
Reg. U.S. Pat. Off.

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

project in February, 1923, and the approval of the plans by the citizens, an organized effort has been made by a powerful group of down-town interests to have the new court-house erected in the vicinity of the old building now standing on Fourth Street, rather than on Twelfth Street, as provided for by the City Plan Commission. When an ordinance was passed by the Board of Aldermen designating Twelfth Street as the location of the new building, the down-town group decided to bring the matter to an issue at the November election by submitting a referendum petition.

The election was preceded by a vigorous campaign, in which the down-town group expended a large fund for newspaper and street-car advertising, the distribution of circulars with packages delivered by department stores, etc. Against such strongly organized banking and commercial interests, and with only a small fund of about $3,000 available, it was difficult to present the city planning point of view, but this was done most effectively through a committee, representing chiefly the local women's organizations, the American Legion, and the labor organizations, cooperating with the City Plan Commission, of which Harland Bartholomew is Engineer.

Following the approval of the ordinance by the voters, the referendum committee publicly announced their acceptance of the people's decision. The complete execution of the plaza and group plan as prepared by the City Plan Commission is now assured, and a commission of architects to supervise the plans for the buildings and improvements will shortly be appointed.

The Municipal Bond Market

By Sanders Shanks, Jr.

Editor, *The Bond Buyer*

AT the November elections, in addition to voting for a President and a Vice-President of the United States and other Federal and local officials of importance, the voters of many communities were asked to decide whether or not bonds should be issued to defray the cost of certain public improvements. Reports are now available showing the results of about two-thirds of these bond referendums, including virtually all those where large bond issues were proposed.

As of November 14, it appears that seventy-two communities (by community is meant an entire state, a county, a city, a village or a district) approved issues aggregating $258,230,000, while twenty-eight communities defeated issues amounting to $114,412,700.

Among these defeated propositions, Kentucky's state highway bond proposal accounts for $75,000,000, while in North Carolina, South Carolina, Montana and Arizona $26,500,000 in state bond issues for soldiers' bonuses, port development, roads and public buildings were turned down. Among the larger cities, we find the most prominent defeat of a bond program was in Columbus, Ohio, where every item in a $10,100,000 program failed to obtain a majority of the ballots.

Bond election results so far received indicate that in the western agricultural states, the tendency to refuse approval of bond issues is more pronounced than in Eastern industrial sections.

Among the successful issues, the largest was the state of Illinois' $100,000,000 road bond authorization. Other states obtaining borrowing authority from the voters are New York, Maryland and New Jersey. Many prominent cities also appear in this list.*

An outstanding feature of the election returns is the voting of bonds for schools by relatively small communities in Pennsylvania. It is suggested that this contemplated borrowing is the result of recent inflation of valuations for tax purpose of the coal lands located in certain sections of the state. Where coal lands constitute the bulk of the real estate valuation of a community, it is easy to understand the readiness of the inhabitants of that district to vote bond issues which must be repaid through taxation of the absentee coal land owners.

Omitting the large items referred to above, here are some of the smaller places and the amounts which they have voted to borrow:

Jefferson Co., Ala.; various purposes	$2,500,000
Lakeland, Fla.; sewer and street improvements	775,000
Ormond, Fla.; street paving and water-works	205,000
Richmond Co., Ga.; schools	350,000
Marion Co., Ill.	110,000
Pontiac, Ill.; bridge	20,000
Scott Co., Iowa, hospital	80,000
Ashland, Ky.; water-works, schools and city building	800,000
Central City, Ky.; city hall, jail, and street improvements	100,000
Russell, Ky.; city hall	50,000
Whitesburg, Ky.; street paving and bridge	25,000
Cadillac, Mich.; schools	53,000
Harrison Co., Miss.; sea-wall protection	2,000,000
White Plains, N. Y.; various purposes	910,000
Grand Forks, N. Dak.; dam and reservoir	75,000
Champion, Ohio; school, gymnasium and auditorium	60,000
College Corner, Ohio; school	60,000
Easton Township, Ohio; school	100,000
Homer, Ohio; school	45,000
Marion, Ohio; sewage disposal plant	20,000
New Philadelphia, Ohio; school	375,000
Vermillion, Ohio; school	200,000
Vernon Township, Ohio; school, gymnasium and auditorium	30,000
Clatsop Co., Ore.; school	100,000
Lakeview, Ore.; sewers	10,000
Multnomah Co., Ore.; bridge	500,000
Carnegie, Pa.; street improvements	225,000
Carrick, Pa.; borough bonds	200,000
Crafton, Pa.; grade crossing and street improvements	284,000
Easton, Pa.; school	270,000
East Berlin, Pa.; water-supply	8,000
Farrell, Pa.; sewage disposal plant	100,000
Hanover, Pa.; refunding	100,000
Lehighton, Pa.; street improvements	125,000
New Castle, Pa.; sewage disposal	300,000
Petersburg, Pa.; school	32,000
Scottdale, Pa.; school	100,000
Sharpsville, Pa.; sewage disposal plant	85,000
Steelton, Pa.; municipal building	50,000
Westview, Pa.; street improvements	45,000
Williamsport, Pa.; school	800,000
Zelienople, Pa.; high school	60,000
Amherst, Va.; water and light	79,000
Fairfax Co., Va.; school	75,000

* EDITORIAL NOTE.—For some of the more important of these bond issues, see "Results of November Election Referenda," page 613 of this issue.

Combined Autocar gas and electric fleet owned by the Dist. of Columbia

One of the District's 4-cylinder, 4- to 6-ton gas Autocars

One of the District's Autocar electrics with trash body

IN September of 1922. the District of Columbia purchased one of the finest Autocar electrics to be put on the market. Although at that time the Autocar electric did not have a proved performance record behind it, the executive commissioners of the District did not hesitate to place their order. They had been Autocar users for a period of thirteen years.

Today they operate a fleet of seventeen Autocars, comprised of fourteen gas Autocars and three Autocar electrics.

Several of these Autocars, including the three electrics and some of the gas Autocars, are used for house to house garbage and trash collection. The electrics work in the more congested districts, where stopping and starting is almost a continuous performance. The gas Autocars collect ashes and garbage on the longer and more thinly populated routes where, in spite of frequent stopping and starting, some of them cover nearly fifty miles a day. One of the 4- to 6-ton models in this work collected forty-nine loads in a month although it had to travel 1,135 miles to do so.

Another of the District's 4- to 6-ton gas Autocars is equipped with a 1,200 gallon street flusher which is worked on two eight-hour shifts a day. This truck flushes an average of 135,000 square yards of pavement on the day shift and 190,000 square yards on the night shift.

Send with your Letterhead

THE AUTOCAR COMPANY
Box 2003, Ardmore, Pa.

Without obligation, please send me

☐ Autocar gas truck book.

☐ Autocar electric truck book.

The Autocar Company
ESTABLISHED 1897
Ardmore, Pa.

Branches in 46 Cities

Autocar
gas *and* electric trucks
EITHER OR BOTH - AS YOUR WORK REQUIRES

More Letters on Safety at Railroad Crossings

Action in Indiana

To the Editor of THE AMERICAN CITY:

In appreciation of your kindly interest and aid in the promotion of the Grade Crossing Safety Conference for the state of Indiana, held in the State House October 14 and 15, I am enclosing to you herewith a copy of the resolutions adopted by that conference. The adoption was without a dissenting vote.

The membership of this conference was made up of two representatives from each of the steam railroad and electric railroad companies, operating in whole or in part in Indiana, together with two representatives from each of several civic organizations, such as the State Chamber of Commerce, Farm Federation Bureau, Rotary International, Kiwanis, and others. The total membership present was 142, representing interests pertaining to all points of view of grade crossings. The program was made up so that all these different interests would be presented to the convention. The discussions were good and the interest was all that could be expected.

F. T. SINGLETON,
Commissioner, Public Service Commission of Indiana.

EDITORIAL NOTE.—The resolutions referred to by Commissioner Singleton recommend the creation of a Department of Safety of the Public Service Commission of Indiana, at the head of which shall be a member of the Commission to be designated "Commissioner of Safety"; and the appointment by such Commissioner of an advisory committee of seven persons, not members of the Commission. The following steps, among others, for the reduction of grade crossing accidents are recommended in the resolutions:

"That the elimination of grade crossings should proceed in an orderly and expeditious manner, so far as financially practicable, and the creation of new crossings should be avoided wherever possible.

"That the Public Service Commission shall have the power to require railroad companies to install and operate flash-light signals, signs, or other modern signal devices at railroad crossings over highways in the country, and Common Councils of cities and Boards of Trustees of towns shall have power to require the installation of like devices at such crossings in cities and towns.

"Where grade separation is not now already provided for by law, that highways that cross and recross tracks should be eliminated and adjacent crossings consolidated wherever possible.

"A safety zone, not in excess of 300 feet from the nearest rail, should be prescribed at grade crossings, within which unnecessary obstructions on adjoining land to the view of the traveling public and distracting commercial signs should be removed, and that new buildings and other structures thereon, constituting actual or constructive obstructions to the view, should be only constructed or erected upon permit, first obtained therefor, from the Public Service Commission.

"That the Legislature shall invest the Public Service Commission of Indiana with the power of eminent domain for straightening and relocating highways or for the purpose of removing buildings, trees, or any other obstruction along such highways, provided that the same shall not apply to highways within incorporated towns or cities, and in towns and cities the Boards of Public Works, the Common Councils or the Boards of Trustees of towns shall have like power to condemn property for the removal of such obstruction.

"That a 'Stop, Look and Listen' law be enacted, empowering the Commissioner of Safety, after a survey thereof, to designate certain dangerous grade crossings, at which the vehicular traffic shall stop, and that at all grade crossings, except such as are protected by watchmen, gates or mechanical or electrical warning signals, approved by the Public Service Commission, the motorist shall be required to proceed in low or intermediate gear.

"That the principles of safety be included in the curriculum of every school.

"It is the unanimous opinion of this committee that one of the greatest menaces to safety upon the highways of the state is that of the operation of automobiles by drunken drivers; we are of the opinion that legislation touching this subject is probably already sufficient, but that most of this violation is due to a failure of the judges and juries to punish offenders with sufficient sentences, and we therefore recommend to the prosecuting offices and courts that such violations be punished with greater rigor, and that it is also the duty of all citizens to report such offenses and assist in their prosecution.

"That the above resolutions apply alike to grade crossings of steam and interurban railroads."

A Full-Stop Rule Should Sometimes Work Both Ways

To the Editor of THE AMERICAN CITY:

I am in accord with your "Program for Fewer Deaths at Railroad Crossings," with the exception of section 6 relating to automobiles coming to a full stop before railroads crossing at grade. This should work both ways; that is, both the automobile and the train should be required to stop under certain conditions.

In the state of Delaware, which has a length of 100 miles and an extreme width of 36 miles, the main highways approximately parallel the main line of the Delaware Division of the Pennsylvania Railroad, and cross the railroad branch lines; while the feeder or secondary highways approximately parallel the railroad branch lines and cross the main line. The following are instances of highways crossing at grade at which trains might well, and perhaps should, stop:

Main highway crossing railroad branch lines.—(1) At Corbitt, on branch line twelve miles long; no towns except at termini; six trains of two or three cars daily. (2) Near Milford; six passenger and four freight trains daily. (3) Near Ellendale; two mixed trains daily.

Feeder highways crossing railroad main line.—At crossings which are at or near depots where trains make regular stops. Where crossing is beyond depot, trains should stop short of crossing. Where depot is beyond crossing, trains should stop short of crossing, and then pull clear of it and stop at depot. Because of the nearness of the crossing to the depot, train traffic would be little delayed.

No doubt there are similar conditions throughout the country which make it more desirable for the train to stop for the highway than it is for the automobile to stop for the train. Perhaps those who advocate that the automobile stop for the railroad have in mind the old-fashioned idea that the railroad should receive consideration above all other traffic.

I. PAUL JONES,
Secretary, Delaware State Highway Department.

[For THE AMERICAN CITY's "Program for Fewer Deaths at Railroad Crossings," and other letters on the subject, see page 185, September, 1924, and page 432, November, 1924.]

BAKER SNOW PLOWS
For Motor Trucks and Tractors

IS YOUR CITY SNOWBOUND?

Everyone realizes the folly of permitting important thoroughfares and the principal highways to remain clogged and choked with snow and ice.

Besides the existing fire hazards countless of dollars in business losses are sustained each year by merchants in those localities which have not yet provided snow removal equipment.

BAKER SNOW PLOWS

It is not difficult to understand why Baker Plows are popular favorites. Fifteen years' experience has put quality and workmanship in these units which cannot be found in others.

Baker Snow Plows are made for large and small tractors and trucks.

Send for our big Snow Plow Catalog.

THE BAKER MFG. CO.

503 Stanford Ave. **Springfield, Illinois**

The City's Legal Rights and Duties

Conducted by A. L. H. Street, Attorney at Law

Extent of Municipal Control Over Streets

LIKE other municipal powers, authority in a city to control the use of streets is not inherent, but depends upon express or implied grant by statute or charter. And it seems that, as declared by the courts of New Jersey, primary power of a state legislature to control the use of streets may be resumed at will. (58 Atlantic Reporter, 71.)

When the state delegates control to a city, the city becomes vested with as full power as the state could exercise, to the extent that authority is delegated. (136 Illinois Reports, 489.)

Municipal Control Over Laying Sidewalks

In several instances, courts of last resort have declared the existence of power to compel abutting property owners to construct at their own expense sidewalks of specified kinds. For example, in an Indiana case (150 Indiana Reports, 814), it was decided that an incorporated town could enjoin a property owner from laying a brick sidewalk, where one of stone was required by ordinance. The Court said:

"Such owner certainly has no right to undertake to improve a public street permanently or any part thereof, according to his own volition, and thereby interfere with or disturb the public authorities in the exercise of the powers with which under the law they are vested, and are endeavoring to carry into effect."

The decision is in line with an earlier holding by the Appellate Court of the same state (49 Northeastern Reporter, 474) that the authority of a city over the streets extends over the sidewalks as a part thereof.

Use and Control of Land Dedicated to Streets

Land used as a street is primarily acquired to enable the public to travel from one place to another, notes the New York Supreme Court for Erie County in the recent case of Cary vs. Schwab, 205 New York Supplement, 903. The strip properly can be divided into roadway and sidewalk, and the space between the paved or traveled portion of the street and the sidewalk or building line can be used for proper street uses, such as maintaining grass plots, planting shade trees, placing stepping-stones, hitching-posts, etc., so long as they do not hinder travel. The municipal authorities may be and are legally bound to make such changes in the areas devoted to street and sidewalk traffic as changing conditions require.

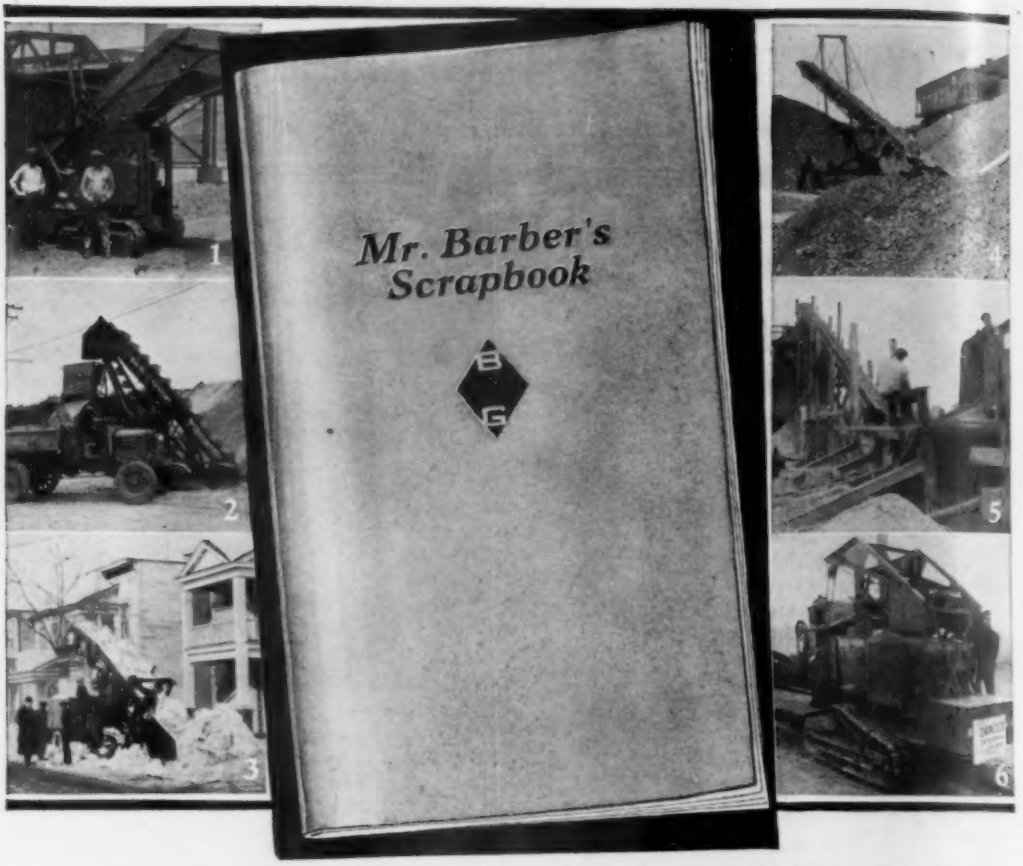
The same opinion recognizes that an abutting property owner has a qualified interest in trees in front of his premises to such extent that he can recover damage to his property caused by wrongful interference with the same. But he has no such propriety interest, the Court adds, as to prevent the city from improving the street by removing the trees, so as to afford the full benefit to the public which was contemplated when the strip of land was acquired for street purposes.

"The municipal power . . . is liberally construed so as to effect the object of the grant, and authorizes control of the entire length and breadth of the street; also above and below the surface as far as any proper street use may require, but not beyond the street line." (28 Cyc. 849-850.)

Control of Streets Cannot Be Delegated

A decision illustrating the generally recognized legal principle that legislative powers vested in a certain body cannot be delegated was handed down by the Illinois Supreme Court in the case of City of Chicago vs. Trotter, 26 Northeastern Reporter, 359. Overturning an ordinance which purported to forbid parades, etc., upon streets, without police department permission, the Court declared:

"The ordinance . . . seems to proceed upon the theory that some of such demonstrations are to be allowed . . . and others prevented. It does not, however, fix . . . the conditions under which the parades and processions will be unlawful. It merely leaves it to the discretion or caprice of the superintendent of police to imperatively prescribe who shall be permitted to gather together in such processions, and who shall not, to dictate that the members of one political party, or of one religious denomination, or of one civic society may, and the member of another . . . may not, have such parades or processions. . . . It is subversive of the liberty of the citizen, and outside the domain of the law, that authority so arbitrary should be lodged in one individual. The powers that were granted by the state, and that are relied upon by the municipality, were delegated to the city council; and that body could not transfer its legislative prerogatives, and



For one cent you can inspect thirty-five material-handling jobs

You have often wanted to examine the material-handling layouts that have proved conspicuously successful in plants similar to your own. Yet the cost of a satisfactory tour of inspection is prohibitive, both in time and money.

For one cent you can have this information, in brief and lucid form, ready for instant reference, by sending a postcard for "Mr. Barber's Scrap Book."

As designer of Barber-Greene equipment, Mr. Barber has maintained a rigid check on the way in which Barber-Greenes are meeting material-handling requirements of every sort.

He has acquired such a mass of valuable data which bears directly upon your own operations, that we have collected some of it and bound it in a compact forty-page booklet.

The photographs show graphically how a great many companies are defeating the heavy overhead costs of unskilled labor, and at the same time often increasing production speed as much as 300%.

With immigration restriction choking the supply of unskilled labor at its source, the high cost of moving materials by hand threatens to mount even higher. This presents you with a serious problem, which cannot be ignored without loss. It is just here that "Mr. Barber's Scrap Book" should prove valuable. It will point the way to greater economy, efficiency and speed, no matter what the nature of your work. Send for it.

BARBER-GREENE COMPANY—*Representatives in Fifty Cities*—515 W. Park Avenue, Aurora, Illinois

BARBER GREENE

Portable Belt Conveyors — Self Feeding Bucket Loaders

Coal Loaders . Automatic Ditch Diggers — Snow Loaders . . . . Coal Feeders

the public trust which was imposed upon it, to a mere executive officer."

Use of Sidewalks for Private Purposes

That, excepting as to the natural rights of abutting property owners, a city has no power to authorize the use of streets and sidewalks for private purposes disconnected from public travel, etc., is a proposition of law that has been laid down by the courts frequently.

A concrete example is afforded by the recent decision of the Louisiana Supreme Court in the case of Viering vs. N. K. Fairbanks Co., 100 Southern Reporter, 729. It was there decided that a municipality could not validly empower a manufacturing company to erect and maintain on the sidewalk in front of plaintiff's premises posts supporting guy-wires holding a smoke-stack in position.

But it was decided that since plaintiff had permitted the company to maintain for thirty years such posts on his own property, a vested right to maintain them was acquired.

Solicitation of Business on Streets

An ordinance forbidding the soliciting of business on a street or public sidewalk must be general in its operation in order to be valid, according to the decision reached by the Missouri Supreme Court in the case of Lerner, 218 Southwestern Reporter, 331. The Court annulled a St. Louis ordinance forbidding one to solicit persons on a street or sidewalk to buy goods of the same kind dealt in by one having a place of business abutting upon such place. The Court said:

"Instead of prohibiting the general personal solicitation of persons for business purposes upon the streets and sidewalks of the city, its application is limited to the prohibition of such solicitations to persons in like lines of trade in front of the store or place of business of a competitor. . . .

"Certainly, if it be an ill requiring legislative supervision to regulate the solicitation of business upon the streets and highways within the limits prescribed in the ordinance, then it must follow that it is equally an ill to solicit business elsewhere upon any of the thoroughfares of commercial activity in the city."

Temporary Playground on Street

But the Arkansas Supreme Court very lately recognized the right of village authorities to temporarily rope off part of a street for use in providing a baseball ground for school children. (259 Southwestern Reporter, 396.)

Consent of Property Owners to Parking Autos

And the Kansas Supreme Court has ruled that passenger-carrying vehicles may be licensed to stand at such places along street curbs as may be consented to by abutting property owners. (189 Pacific Reporter, 969.)

No Compensation to City for Poles and Wires

It has been ruled in Vermont that a city has no proprietary right of compensation for the use of streets by an electric power company for a line of poles and electric wires, the right of granting the privilege being primarily with the State Legislature. And where a company had occupied streets before the city's charter was so amended as to empower the city to regulate the use of the streets, the company had such vested rights as to preclude the city from requiring setting apart of the top gain of each pole for city use, as a condition to continued maintenance of the poles in the streets. (106 Atlantic Reporter, 513.)

Abutter's Rights in Subsurface

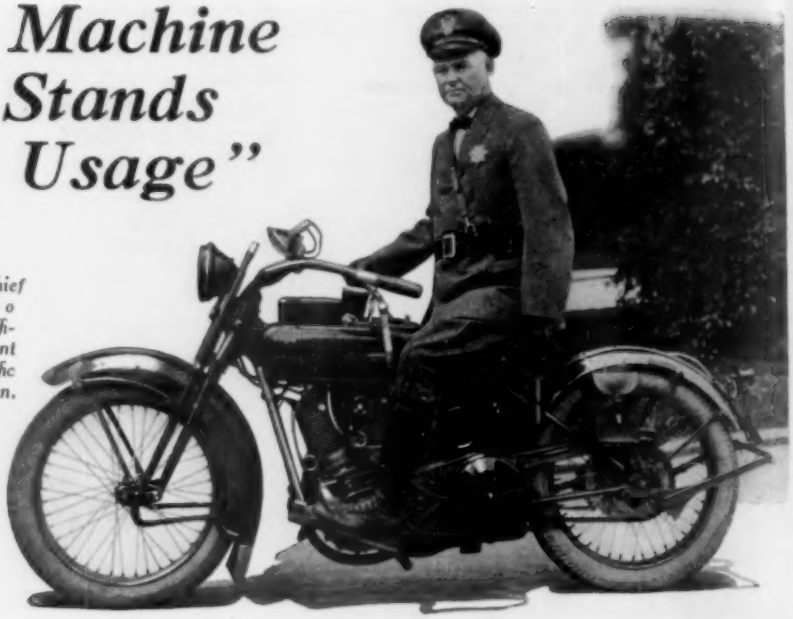
A city may require abutting owners to secure permits before making any opening in a sidewalk, and to see that proper safeguards are thrown about the work, and that public use of the sidewalk is not unreasonably interfered with. The city may also regulate how excavations in the subsurface of the street shall be made by an abutter, and how trap-doors, etc., shall be constructed. But it may not arbitrarily refuse to grant a permit, nor, under the guise of regulation, place an additional burden on the abutter, or make regulations that would in effect deprive him of his rights in the subsurface. (82 Southern Reporter, 775.)

Use of Streets by Jitneys

It seems established that cities cannot prevent reasonable use of streets for interstate or interurban traffic, but that ordinarily a city may regulate or prohibit the use of streets for intracity traffic by so-called jitneys, etc. In an illustrative case (Davis vs. City of Houston, 264 Southwestern Reporter, 625), the Texas Court of Civil Appeals at Galveston lately said:

"The distinction between the ordinary use of streets by a citizen in traveling or transporting his property thereon in the usual course of life and business, and their use as a place for carrying on a private business such as operating for private gain jitneys or other means of transportation thereon, is obvious and is recognized by all the authorities. The ordinary use of the streets by the citizens is an inherent right which cannot be taken from him by the city and may only be controlled by reasonable regulation, while the right to use the streets for conducting thereupon a private business of any character is not an inherent or vested right and can only be acquired by permission or license from the city, and the power of the city to withhold such permission or license is an essential and necessary prerogative of municipal government."

"Only Machine That Stands Hard Usage"



T. M. Ryan, Chief of Sacramento County Traffic Officers, and President of California Traffic Officers' Association.

CHIEF RYAN says: "We have been using Harley-Davidson Motorcycles since 1919 with the very best results. I find that it is the only machine that stands the hard usage and abuse a machine ridden by a Traffic Officer has to go through. We have used other makes of motorcycles, and in comparing upkeep and operating cost, we find the Harley-Davidsons are far below other machines.

"Two of our three Harley-Davidsons have covered over 15,000 miles without having the motors taken down, and they still have enough speed for our work. In fact, all three machines will do better than 80 miles per hour. We find the Harley-Davidson is the only machine that will keep its speed for long runs."

No wonder 1900 cities, towns, and state and county departments use Harley-Davidsons for police work! *Why not yours?*

Features of 1925 Harley-Davidsons

Handsome "Stream-Line" design. More power, more speed. Lower riding position. Larger tanks. Easier riding. Better springs. Bigger tires. *Yet the price is reduced!* Ask your dealer, or write to factory for illustrated literature.

Write for special literature on 1925 models of "America's Police Motorcycle."

HARLEY-DAVIDSON MOTOR CO.
Dept. M Milwaukee, Wis.

Harley-Davidson
The Motorcycle

Results of November Election Referenda

AMONG the many interesting reports which have reached THE AMERICAN CITY of referenda results at the election on November 4 are the following:

WISCONSIN.—Adopted a municipal home rule amendment to the state constitution. It provides that "Cities and villages organized pursuant to state law are hereby empowered to determine their local affairs and government, subject only to this constitution and to such enactments of the Legislature of state-wide concern as shall with uniformity affect every city of every village. The method of such determination shall be prescribed by the Legislature."

ARKANSAS.—Adopted a home rule constitutional amendment, Section 1 of which reads: "No local bill shall be passed by the General Assembly of the state of Arkansas. Counties and municipalities shall have the power of legislation as to all local and special legislation of every character in and for their respective municipalities and counties, the manner to be provided by law, but no local legislation shall be enacted contrary to the constitution or contrary to any general law of the state." The amendment also makes provision for the exercise of initiative and referendum in local legislation.

ILLINOIS.—Approved a bond issue of $100,000,000 for road improvements.

MICHIGAN.—Voted favorably on an initiative proposition for a 50 per cent increase in motor licenses, a two-cent tax on gasoline, and a speeding-up of the state road-building program.

MASSACHUSETTS.—Voted to continue Daylight Saving as a state-wide measure.

NEW YORK STATE.—Approved a bond issue of $15,000,000 for the creation of a comprehensive state park system.

MICHIGAN.—Defeated a proposed constitutional amendment which would have required all children between the ages of seven and sixteen years to attend a public school until they had graduated from the eighth grade.

CINCINNATI, OHIO.—Adopted a new charter providing for the city manager plan with proportional representation. (See page 534 of this issue.)

PHILADELPHIA.—Authorized the spending of $39,850,000 for a great variety of improvements.

LOS ANGELES.—Adopted a Major Traffic Street Plan as the official municipal plan for the future laying-out, opening and widening of streets, avenues and boulevards throughout the entire city, as well as correcting, wherever possible, past street-planning errors; and approved a bond issue of $5,000,000 for starting the work.

CAPE MAY and OCEAN COUNTIES, N. J.—Approved the creation of county libraries. Such libraries are already in operation in Burlington, Morris, Camden and Monmouth Counties. Their cost is one-fifth of a mill on the assessed valuation of the districts served.

ST. LOUIS, MO.—Approved the building of a new court-house, in accordance with the plans for a municipal plaza and public building group set forth by the City Plan Commission. (See page 603 of this issue.)

LOUISVILLE, KY.—Authorized $5,000,000 of grade-crossing elimination bonds and an equal amount of sewer bonds.

EAST BAY MUNICIPAL UTILITY DISTRICT, CALIFORNIA (comprising the cities of Oakland, Berkeley, Alameda, Piedmont, Richmond, San Leandro, Albany, Emeryville, and El Cerrito).—Authorized $39,000,000 in bonds for developing the first unit of a new source of water-supply.

SAN FRANCISCO, CALIF.—Defeated a proposal to increase the Mayor's salary from $6,000 to $12,000 a year, but approved salary increases of $1 a day for employees of the Fire and Police Departments. Also approved a charter amendment providing for the purchase and maintenance of playgrounds and recreation centers; the cost to be not less than 5 nor more than 7 cents upon each $100 assessed valuation of property. Another of the several amendments adopted establishes a revolving fund for street work that is to be paid for by selling 15-year bonds.

PORTLAND, ORE.—Adopted a zoning ordinance and several charter amendments, providing for the creation of special street-lighting districts under the local improvement code; voting $500,000 additional (county) bonds for constructing the Ross Island and Sellwood bridges; and authorizing for general municipal purposes an additional tax of 2.2 mills over the 8 mills already authorized by the charter.

CHICAGO, ILL.—Approved $1,000,000 in bonds for the extension and rehabilitation of the street-lighting system; $3,000,000 for the city's share of certain street-widenings, and $3,000,000 for enlarging and completing the stadium in Grant Park.

CLEVELAND, OHIO.—Authorized an additional levy of 1/10-mill for the work of the Metropolitan Park Board, which has charge of the purchase, development and maintenance of a series of rural parks and forest reservations around the city of Cleveland. This additional levy will add to the Board's income about $225,000 annually.

BALTIMORE.—The county approved a bond issue of $1,500,000 for the construction of thirty elementary schools; and the city authorized five loans which included a $10,000,000 sewer loan, $7,000,000 for paving, bridge construction and abolition of grade crossings, $2,000,00 for a municipal office building, $1,500,000 for an extension of the city's electrical conduit system, and $1,000,000 for the erection of a municipal art museum.

DAYTON, OHIO.—Authorized $4,600,000 for schools and $8,600,000 for general municipal construction.

GREENVILLE, S. C.—Approved $2,000,000 of water-supply bonds.

NASHVILLE, TENN.—Water-works extension bonds of $3,000,000 approved.

AKRON, OHIO.—Approved a $3,500,000 sewer bond issue and $2,500,000 for school buildings, sites and athletic facilities; and defeated a proposal of $3,000,000 for a municipal bus system.

OMAHA, NEBR.—Authorized a bond issue of $250,000 for acquiring approximately 600 acres of land needed for a system of small parks overlooking the river; and $2,500,000 for constructing, remodeling and equipping school buildings.

Fordson With Scraper and 2 Men Does Work of 3 Teams and 6 Men

Saves $758.53 A Year On Snow Removal for Windsor, Canada

There are no idle hours for the Fordson. It furnishes dependable, low-cost power for road work, heavy hauling, street scraping, sprinkling, garbage collection and removal, lawn mowing, park and street maintenance, wood sawing, snow removal—in fact for every municipal power job! Snow removal is only one of the many important power jobs done better with Fordson. You can depend on Fordson to keep the "thoroughfares" open at a big saving in time, money and labor.

The experience of Windsor, Canada, will interest you. J. E. Hillman, Commissioner of Public Works, says: "In city snow removal, a Fordson Tractor hauling a scraper can remove 3 times as much snow as a team pulling a scraper. One Fordson with driver and helper actually does the work of 3 teams, 3 drivers and 3 helpers.

"In a year we average 35 eight-hour days of snow removal. We hired our teams with drivers and helpers at $1.50 per hour, so 3 teams for this work would cost $1260.00 a year. The cost of the Fordson with driver and helper for the same period is only $501.46, giving us an hourly saving of $2.70 or a net saving for the year on snow removal alone of $758.54."

Your nearest authorized Ford dealer can furnish additional facts and figures on the cost of operating Fordson for municipal work of all kinds. Call for this information and a practical Fordson demonstration.

Fordson Tractor $495, f. o. b. Detroit

Ford

CARS · TRUCKS · TRACTORS

From the International Union of Cities

Items translated from "Tablettes Documentaires Municipales" by Stephen Child, 538 Merchants Exchange Building, San Francisco, Calif., to whom requests for further information regarding this source of civic documentation should be addressed

The New Land Policy of Germany. 33.3 (43)

The German Reich has recently passed a so-called "Home State" (Heimstatten) Law. These "Home States" are really large colonies for state agents, officers, pensioners, or beneficiaries under the shortage of employment conditions. Their pensions are capitalized, and in exchange for this capital the state places at the disposition of each a house and a relatively large extent of land; usually uncultivated heath, which the new owner is expected to clear, grub-up and cultivate, in order that he may thus find a new means of subsistence. These "Home States" form entire villages, and there are now several in the province of Hanover.

The new law, divided into three parts, provides for the organization of the authorities of such "Home States"; regulates the particular laws which will govern them, and also regulates the particulars of succession in ownership of land.

The Engineering Basis of Town Planning. 71

Professor Humphries of the University of Birmingham, England, has recently discussed what he terms the three fundamental technical factors of city planning—first, the system of sewers, next the highways, and then other means of transportation. As to sewers, he maintains the necessity of preserving the natural watercourses and of cooperation of various communities in the treatment or disposal of sewage. He refers to the creation of the Midland Regional Plan Commission and affirms that it would be difficult to estimate the enormous advantage in the saving of public funds that such a commission would have been able to realize if it had only been organized years ago.

Regional Planning Procedure. 71.2

At a City Planning Conference held at the British Empire Exposition at Wembley, near London, G. L. Pepler maintained that before elaborate planning, a regional survey should be made to determine what sort of city planning policy is best suited to the region. This policy or program and a preliminary plan should then be presented, first, in a schematic form setting forth all that should be done eventually, what is possible to do immediately, and what may be reserved for a later day. He would develop a regional plan which would dominate all the constituent parts; completing each one then as to its individual details, rather than attempt to adjust these details (each one of which should be studied separately) to the general plan.

City Planning. 71.2

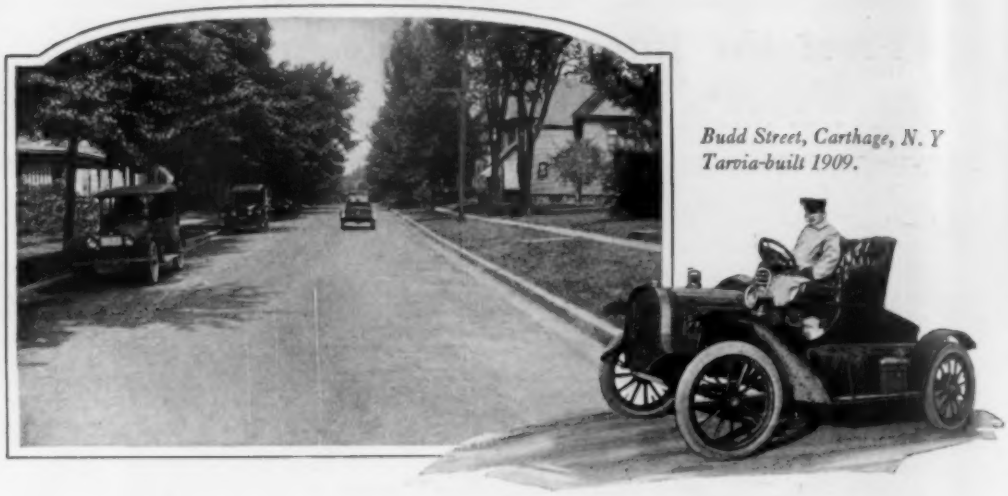
Professor Adshead of the University of London, at the Wembley City Planning Conference, stated that it is necessary, in the first place, in regard to city planning, to concentrate all efforts to prevent the building of more than twelve houses to the acre, with the exception of built-up portions of existing cities, where similarity with the best of existing arrangements would be permitted. In rural districts he would have no more than eight houses to the acre. In the second place, he urges the importance of taking care that groups of new houses are not too large and do not exceed a certain number. In planning for the extension of principal streets, those opening out from quarters already built up should maintain an architectural harmony with the older portions, as has been done in Rome, Paris and Brussels.

City Planning in Central Germany. 71.31 (43.2)

The housing and town planning problems of Magdeburg, Germany, are now under consideration, and in planning for the arrangement of new residential districts, considerations of a social order have been placed first, before economic ones. First, the density of urban population should not be allowed to pass a certain limit. Second, to each inhabitant should be given the possibility of enjoying the open country, which should be made readily accessible. The general plan of Magdeburg determines definitely the outlines of the city in the form of a star, including several suburbs, in such a way that open spaces in the shape of angles or bays with forests and other verdure lead toward the center of the town. Beyond this determined outline or limit, the extension of the city will be arranged in the form of colonies on the right bank of the Elbe, the left bank, being very fertile, to be reserved for agriculture. Arrangements are made in the new plan for convenient new allotments, for zoning and for open spaces. Magdeburg is evidently to become a true garden city when these plans are executed.

Housing and Other Improvements at Bradford, Yorkshire, England. 61.438.3 (42.74)

Bradford has a very unhealthy slum quarter known as White Abbey, which it is now proposed to improve, necessitating an expense of £235,766. This district covers 15 acres, of which 10 are particularly unhealthy, and to which the remaining 5 acres are annexed in order to permit the realization of a practical and complete plan. The district now includes 575 houses, with a density of 58 houses to the acre, as against 4 to the acre, the average density of the remainder of the city. During the last nine years the number of tuberculosis cases in this quarter attained the high figure of 45 to the 1,000, while for the remainder of the city the figure was only 14.3 to the 1,000. This White Abbey district in proportion to its extent sends to the Municipal Hospital 2½ times more cases of illness than all the rest of the city. The district is going to be rearranged with a view to the future needs of the city, and the necessary land is to be taken for widening White Abbey Street to 75 feet. The frontage of this street will be reserved for offices and shops.



Budd Street, Carthage, N. Y
Tarvia-built 1909.

First welcomed by motorists in 1909 — this Tarvia Street is still good

YOU pioneer motorists—what a thrill of freedom your first car gave you! At last you could travel anywhere—any time.

But comfort was another thing. Generally the roads were dusty or muddy, scarred with ruts and washouts. What relief when you rolled onto Tarvia pavement—smooth, mudless, dustless—like Budd Street in Carthage, New York. Laid in 1909, this Tarvia pavement—after fifteen years of unceasing traffic—is as good as the day it was built.

Tarvia pavement can be kept good indefinitely at little cost. And in addition: A Tarvia pavement will not wave, roll or rut. A Tarvia pavement is skid-proof, because of its granular surface. For the money spent, Tarvia gives more miles and the most years of satisfactory service.

On request, we will gladly send you illustrated booklets, construction data and specifications.

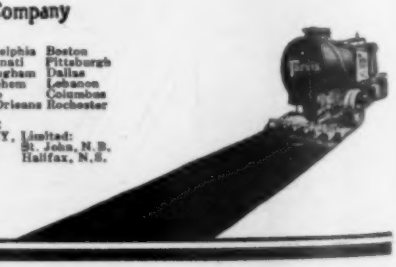
The Barrett Company

Tarvia
For Road Construction Repair and Maintenance

New York	Chicago	Philadelphia	Boston
St. Louis	Cleveland	Cincinnati	Pittsburgh
Detroit	Kansas City	Birmingham	Dallas
Minneapolis	Salt Lake City	Bethlehem	Lebanon
Youngstown	Milwaukee	Toledo	Columbus
Baltimore	Syracuse	New Orleans	Rochester

In Canada:
THE BARRETT COMPANY, Limited:

Montreal	Toronto	St. John, N.B.
Winnipeg	Vancouver	Halifax, N.S.



Municipal and Civic Publications

Prices do not include postage unless so stated

Public Water Supplies.—By F. E. Turneaure and H. L. Russell, Dean, College of Engineering, and former Professor of Bacteriology, University of Michigan, respectively; with a chapter on Pumping Machinery, by D. W. Mead, Professor of Hydraulics and Sanitary Engineering, University of Wisconsin; and three chapters on Quality of Water Supplies, revised by C. M. Baker, State Sanitary Engineer of Wisconsin. Third edition, revised. John Wiley & Sons, Inc., New York. 1924. XVI + 766 pp. Illustrated. $6.00.

This book, which has been standard since its first edition appeared in 1901, brings up to date the very broad subject of public water-supplies, their qualities, and the means of procuring and distributing them. The second edition contained considerable revision in the treatment of the subject of filtration, dealing particularly with the development of rapid sand filtration. The present edition contains no fundamental changes in this field, but does contain a large amount of new information and important improvements. Special attention is given to the consumption of water, stream flow, filtration, chlorination, the quality of water-supplies, reinforced concrete in waterworks construction, and pumping machinery, with additional information on these subjects. The bibliography has been revised and brought up to date.

Municipal Canada.—British Empire Exhibition Number. Published by the Municipal Publishing Co., Limited, Montreal, Canada. 1924. 191 quarto pp. Many illustrations.

A pictorial gazeteer of urban and rural life in Canada, published for the express purpose of placing before the British public the various opportunities to be found in the nearly 4,000 Canadian municipalities, and thereby attracting capital and settlers. Describing the resources, facilities, industries, advantages and administration of the municipalities and provinces of Canada, with interesting references to individual public service.

Handcraft for Home, School, Playground and Summer Camp.—Published by the Playground and Recreation Association of America, 315 Fourth Avenue, New York. 32 large mimeographed pp., with many full-sized patterns. $1.25.

A delightful and stimulating collection of designs and instructions which will enable boys and girls of different ages to make a variety of articles with common materials and few and inexpensive tools. Many of the articles have actually been made by children in city playgrounds in the Middle West. The working kit is described and all essential hints and helps are given for using the tools and materials. The articles include toys of cardboard, cork, wood, and tin, and range from furniture and racing autos to birdhouses and kites. A bibliography is given which will lead to more advanced work.

Bulletin of the National Conference on Outdoor Recreation.—No. 1 (September 1, 1924), issued for the information of the members of the Conference and of the American public. The Conference was organized in May, 1924, to serve as a clearing-house through which the states, municipalities, quasi-official and unofficial agencies on the one hand, and the Federal Government on the other, may best cooperate with each other to make available to the people the opportunities and facilities for wholesome outdoor recreation, physical training, and nature study essential to their spiritual, moral and physical welfare. (Apply to the Executive Secretary of the Conference, L. F. Kneipp, Room 2034, New Navy Building, Washington, D. C.)

The Public School Debt in Illinois.—A report reviewed and presented by the Educational Finance Inquiry Commission under the auspices of the American Council on Education, Washington, D. C. The report was prepared for the Commission by George W. Willett, of the Illinois staff. Published by The Macmillan Company, 64 Fifth Avenue, New York, N. Y. 1924. XV + 97 pp. Diagrams, tables. "Illinois is not peculiar so far as the problem of public school debt is concerned, and school debt is but one element in municipal debt. It is, therefore, hoped that the volume will be of service to school and municipal officers in other states, to students of public finance in general, and to unofficial and non-professional readers who are interested in the financing of public enterprises." $1.00. (Apply to the publishers.)

Public Finance.—By Harley Leist Lutz, Ph. D., Professor of Economics in Leland Stanford, Jr., University. D. Appleton and Company, New York. 1924. XVI + 681 pp. $4.00.

This book seeks to bring together theoretical and practical knowledge—a study of principles and of experience in the collection and disbursement of public revenue. Public expenditure is treated first, as being one of the most important divisions of the subject. Revenue sources other than taxation are considered in the section preceding the one which is devoted entirely to the various forms of taxation. The special characteristics of public debts and the use of public credit are dealt with in the study of a special method of obtaining income. Public financial administration is the subject of the final section, describing the procedure by which government coordinates income and outgo—collects, keeps, appropriates, and expends public funds. The book is clear and interesting, and should find many readers and students outside of the classroom.

The Appraisal of Real Estate.—By Frederick Morrison Babcock, B. S. The Macmillan Company, New York. 1924. IX + 380 pp. Views, diagrams, tables. $3.50.

The third volume in the standard course in real estate outlined by the Joint Commission representing the National Association of Real Estate Boards, the United Y. M. C. A. Schools, and the Institute for Research in Land Economics and Public Utilities. The foundation and elements of real estate values are discussed as a basis for appraisal procedure and methods. The principles of appraising income-producing property and computing net income, the appraisal of residential and farm property and of lease equities are explained, and also the determination of depreciation and obsolescence. The final chapter is a study of the comparative values of city land. Working tables and formulas are given.

Criminology.—By Edwin H. Sutherland, Ph. D., Assistant Professor of Sociology, University of Illinois. J. B. Lippincott Company, Philadelphia. 1924. 643 pp. $3.50.

This volume is a text-book in the Lippincott Sociological Series, edited by Edward Cary Hayes, Ph. D., LL. D., Professor of Sociology, University of Illinois. It presents a study of the nature and extent of crime, and the policies used in dealing with crime and criminals, in their relation to the individual and to society. There are five chapters on the causes of crime. Other chapters deal with police and court systems, the taking of the law into the hands of the mob or the Klan, punishment and prisons, the release from prison, parole and probation, and finally—the dominant theme of the book—methods of reformation and prevention of crimes. References for wide reading are suggested.

Accounting for Building and Loan Associations.—By R. J. Bennett, C. P. A. Part of the special course in Accounting, Theory and Practice, published by the Bennett Accountancy Institute, Broad and Spring Garden Streets, Philadelphia, Pa. 45 pp. Covering in condensed but detailed form the vital points on building and loan association accounting, for ready reference by accountants, executives and building and loan members. Showing how all the phases of the business are conducted. $3.00. (Apply to the publishers.)

Parks and Playgrounds.—By Henry V. Hubbard, Professor of Landscape Architecture, Harvard University, Cambridge, Mass. American experience as to the requirements and distribution of parks and playgrounds as elements in the city plan. 25 pp. Illustrated. A revision of the author's paper given before the American National Conference on City Planning, for presentation at the International Town Planning Conference, in Amsterdam, Holland, 1924. Including a theoretical diagram showing the distribution of recreation facilities in an American city. Send 10 cents in stamps to Landscape Architecture, Cambridge 38, Mass.)

Country Planning.—A selected bibliography on this subject, published as Number 67 (October, 1924) of The Russell Sage Foundation Library, 130 East 22nd Street, New York, N. Y. 4 pp. Including a summary report of the Librarian for the year ending September 30, 1924. 10 cents. (Apply to the Librarian, Frederick Warren Jenkins.)

Why Grand Rapids, Mich., *uses* Trinidad Pavements

The Trinidad Lake Asphalt Paving on Cherry Street, Grand Rapids, Mich., was laid in 1902—nearly 23 years ago. Photograph above shows section from Jefferson Ave. to Madison Ave.

"Subject to heavy traffic, still in excellent condition. Repairs practically nil to date." These are excerpts from a Street Engineer's report on this pavement made June 22, 1924.

What other smooth-surface paving material could equal this record? Yet this is just one of many hundreds proving the remarkable durability and economy of Trinidad—***the nature-made asphalt.***

Trinidad Lake Asphalt pavements have the additional advantage of being attractive, practically noiseless and easy to repair and keep clean.

Write for our new booklet "Around the World on Native-Lake Asphalt Pavements." It is free.

THE BARBER ASPHALT COMPANY

PHILADELPHIA

New York St. Louis Chicago Pittsburgh San Francisco Kansas City

TRINIDAD LAKE ASPHALT

Recent **Progress in the Standardization of Fire Hose Threads.**—Published by the Committee on Fire Prevention and Engineering Standards, National Board of Fire Underwriters, 76 William Street, New York, N. Y. 18 pp. Illustrated. A brief outline of the principal activities and more important developments to which much of the recent progress is attributed, with a table showing what has been actually accomplished in the work of conversion. Information that concerns every municipality, the railroads, shipping interests, manufacturers of fire-hose connections, and all others dependent on fire hose for protection. (Apply to the publishers.)

The Seasonable Acquisition of Parks and Other Public Open Spaces.—By Gordon J. Culham, of the Harvard School of Landscape Architecture, and Frederick M. Mayer, Jr., of the Harvard Law School. The Frank B. Williams Prize Essay, 1924, in the competition open to all schools offering recognized instruction in various phases of town planning. 14 quarto pp. in the October, 1924, issue of Landscape Architecture. A study of the limitations of the law, and of methods by which the procedure of acquisition of land for parks may be adjusted to present social and economic demands. (Apply to Landscape Architecture, Cambridge, 38, Mass.)

Traffic Regulations, Urbana, Ill.—This ordinance became effective November 1, 1924. It is patterned after the uniform state traffic law and is considered a wise and progressive step in simplifying traffic problems in Urbana. (Apply to C. B. Holmes, City Clerk.)

Regional Planning, West Middlesex, England.—Final Report of the Joint Town Planning Committee upon the Regional Planning Scheme. By Thomas Adams and Longstreth Thompson, town planning consultants, 121, Victoria Street, S. W. 1, London, England. 64 quarto pp. with folding map in pocket of cover. Tables, drawings. This detailed study is presented under divisions which consider the proposals for zoning; the selection of sites for civic and shopping centers; arteries of communication and transportation; joint sewage disposal; housing; and other questions involved in the orderly development of this region. 10s. 6d. (Apply to Ernest S. W. Hart, Hon. Secretary, West Middlesex Joint Town Planning Committee, Guildhall, Westminster, S. W. 1, London, England.)

Smoke Abatement.—Causes for Excess Smoke and Suggestions for Its Elimination. Prepared by T. V. Buckwalter. Issued by the Smoke Abatement Committee of the Canton Chamber of Commerce, Canton, Ohio. 15 pp. Drawings, tables. After a consideration of the economics of smoke abatement, and the causes and sources of smoke, the methods of smoke abatement in connection with domestic and industrial furnaces and locomotives are described, and illustrated by drawings. It is recommended that all educational means for securing smoke abatement in Canton should be exhausted before resorting to legal measures. (Apply to the Canton Chamber of Commerce.)

Suggested Tests for Food Inspector.—By F. A. Moss and Fred Telford. 10 quarto pp. Illustrated. In Public Personnel Studies, November, 1924. The difficulties in the work of public inspecting are outlined, and the qualifications which an inspector should possess in order to meet these difficulties successfully are stated. The tests suggested are largely for general intelligence, and also include specialized intelligence tests in terms of the duties of the inspector. (Apply to the Bureau of Public Personnel Administration, 26 Jackson Place, Washington, D. C.)

Legal Regulation of Bill-Boards.—Bulletin No. 15 (September, 1924) of the Massachusetts Federation of Planning Boards. 19 pp. Covering: the progress in bill-board regulation in Massachusetts to date; the state bill-board law as it now stands; the limitations of the law; the present state regulations; suggestions for municipal regulations; a proposed form of by-law; and the procedure in the adoption and enforcement of by-laws for bill-board regulation. (Apply to Arthur C. Comey, Secretary, Massachusetts Federation of Planning Boards, Cambridge, Mass.)

Proceedings of the National Conference on Outdoor Recreation.—The Conference was held in Washington, D. C., May 22-24, 1924. Senate Document 151. Interesting and valuable material. 244 pp. (Apply to Government Printing Office, Washington, D. C.)

Coach and Bus Operation in New York.—By John A. Beeler, Director, The Beeler Organization, public utility consultants, New York. 4 quarto pp. Illustrated. Reprinted from Electric Railway Journal of August 9, 1924. The Fifth Avenue Coach Company and the municipal busses give quite different kinds of service. In this article statistics of each are compared with those of surface lines in New York. (Apply to the Beeler Organization, 52 Vanderbilt Avenue, New York, N. Y.)

Fire Protection.—Two bulletins issued by the National Fire Protection Association, 40 Central Street, Boston, Mass.: "Clean Your Chimneys!" (No. E. 5a); "Precautions Against Freezing of Fire Extinguishing Appliances" (E-9). Each 4 quarto pp. Illustrated. Practical and timely suggestions. "If people can be educated to understand that it costs the city as much for the fire department to respond to a chimney fire as to a fire in the business district with $10,000 loss, it may interest them enough to make them look after their chimneys." "A very small 'freeze-up' may destroy the efficiency of a very large equipment." (Apply to the Association.)

Philadelphia's Government.—An organization chart and description prepared by Edward Thurber Paxton, specialist in governmental structure, of the Bureau of Municipal Research of Philadelphia. 1924. 39 pp. with folded insert of chart—"Governmental Organization of the City, County, and School District of Philadelphia, Including the County Courts." Separate diagrams on the chart show the relationship of the local government to various agencies doing public or semi-public work and receiving aid from the city treasury, and to portions of the state government in which the Philadelphia local government has a direct share. (Apply to the Bureau, 311 South Juniper Street, Philadelphia, Pa.)

Why Drink Milk?—Folder No. 3 issued by the Children's Bureau, U. S. Department of Labor. Illustrated. Showing that milk is the indispensable food for children, how to use it, and what milk to buy. (Apply to the Children's Bureau, Washington, D. C.)

Work-Study-Play Plan.—Majority and Minority Reports on the Work-Study-Play or Platoon Plan of Elementary School Organization. Based largely on visits to Detroit, Rochester, Pittsburgh, Gary, and Akron, where platoon schools are being operated. The Majority Report is in favor of the system, and discusses the advantages of the plan and the objections to it. 8 quarto pp. Apply to the Secretary, Board of Education, 650 South Clark Street, Chicago, Ill.)

The Public Dance Hall.—A report by the Public Dance Hall Committee of the San Francisco Center of the California Civic League of Women Voters. A report of much interest to recreation workers and park executives, prepared by Mrs. James Rorty. 14 pp. in Parks and Recreation for July-August, 1924. Part One takes up some general considerations involved in a comprehensive dance hall policy, covering a historical summary of the dance, the psychological considerations, and systems of regulating dance halls. Part Two deals with the experience of San Francisco—a very interesting account. It is followed by a supplementary report by Alice Barrows, Chief Supervisor of Dance Halls, San Francisco, covering the period from March 1, 1923, to January 1, 1923. 50 cents. (Apply to Parks and Recreation, American Institute of Park Executives, Minot, N. Dak.)

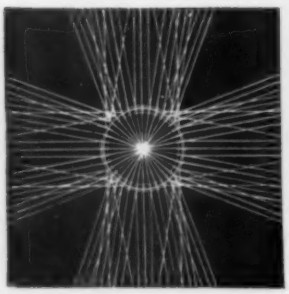
Zoning Procedure for Iowa Municipalities.—By Rolland S. Wallis, Municipal Engineer, Engineering Extension Department, Iowa State College. Bulletin 65 of the Engineering Extension Department, Iowa State College, Ames, Iowa. June 25, 1924. 20 pp. Dealing briefly with the legal powers of Iowa municipalities to zone, and explaining how zoning commissions are appointed and how they function, the value of expert knowledge, the preparation of the base map, the making of the survey, the zoning ordinances, its provisions, adoption and amendments; giving also additional sources of information. (Apply to the Engineering Extension Department.)

Modern Tendencies in Local Transportation.—By John A. Beeler, Director, The Beeler Organization, public utility consultants, New York City. A handy-size 11-page reprint from Electric Railway Journal, of September 27, 1924. Views, tables. Coordinated service, time-saving methods, parking control, faster schedules, and modern, light-weight, attractive equipment stimulate business and lower operating costs. (Apply to The Beeler Organization, 52 Vanderbilt Avenue, New York, N. Y.)

Union County Park Commission, New Jersey.—Report of the Commission for 1922. 30 pp. Illustrated. With chart showing area, population and ratables of Union County and of each municipality on a percentage of the entire county basis. Giving the history of the preliminary and the permanent Commission, and explaining the powers and functions of the latter, with an interesting report of its work. Also a folder entitled, "Information Regarding the Union County Park Commission," dated February 9, 1924. (Apply to the Commission, 286 North Broad Street, Elizabeth, N. J.)

Asymmetrical

The word that is revolutionizing street lighting.



HOLOPHANE

4-Way and 2-Way Refractors

HERETOFORE street lighting units have distributed the light *symmetrically* around the lamp, and consequently a large part of the light has been wasted on house fronts and lawns.

Now Holophane offers two asymmetrical units, which direct the light in only four or two directions, thus keeping the light on the street and giving from 40% to 50% more useful illumination from a given amount of current than have the best previous units.

Above is illustrated the light distribution of the 4-Way Refractor.

Your city should standardize on these units now. Write for booklet.

HOLOPHANE GLASS COMPANY
344 Madison Ave., N. Y. C.
Works—Newark, Ohio *In Canada*—146 King St., W , Toronto

How to Get Useful Maps from the Government.—A single sheet listing and describing some of the most useful of these maps, which may be ordered from the Superintendent of Documents, Washington, D. C., or from the issuing department or bureau. The cost is low, and some are free. They include topographical maps of sections, prepared by the Geological Survey; maps of states in which there is public land, published by the Land Office; rural route maps, issued by the Post Office Department, and others. This list is prepared by The Kiplinger Washington Agency, Albee Building, Washington, D. C., as a special supplement to the Kiplinger Washington Letter. (Apply to the Agency.)

Administrative Consolidation in State Governments.—By A. E. Buck, of the National Institute of Public Administration, New York Bureau of Municipal Research. A compact and complete treatment of the movement for administrative reorganization and consolidation in state governments, with charts. Third edition, revised August, 1924. 47 pp. (Apply to National Municipal League, 261 Broadway, New York, N. Y.)

Electric Railways—Do We Need Them?—By B. C. Cobb, Vice-President, Hodenpyl, Hardy & Co., Inc. An address delivered at the eleventh annual Business Conference of the Babson Statistical Organization, Babson Park, Mass., August 8, 1924. 20 pp. The evolution of urban and interurban transportation is briefly outlined, with an analysis of the conditions affecting the public's riding habit due to the development of the automobile and the motor bus. It is recommended that street cars be given precedence over all other forms of street traffic, to relieve congestion. (Apply to the author, at 14 Wall Street, New York, N. Y.)

Standard for a Socialized Court Dealing with Sex Delinquents.—By George E. Worthington, Acting Director, Department of Legal Measures, American Social Hygiene Association, and Ruth Topping, Field Secretary, Bureau of Social Hygiene. Reprinted from the Journal of Social Hygiene for June, 1924. 26 pp. This pamphlet brings together what has been considered the best practice of specialized courts dealing with sex delinquents in Chicago, Philadelphia, Boston, and New York, as studied by the Bureau of Social Hygiene and the American Social Hygiene Association in cooperation. Judge Edward F. Waite, of Minneapolis, has said that the aim of a socialized court should be "not so much the adjudication of private rights as the performance of what are conceived to be community obligations." (Apply to the Association, 370 Seventh Avenue, New York, N. Y.)

The Water-Supply of Lawrence, Mass.—Conclusions and Recommendations about the City's Water-Supply. Prepared by Chester H. Wells, sanitary engineer. Approved by the Board of Directors of the Lawrence Chamber of Commerce, September, 1924. 8 pp. Recommending the immediate construction of a new covered slow sand filter and the rebuilding of the old open sections of the present filters, with other means of securing an adequate and safe water-supply. (Apply to the Chamber of Commerce, Lawrence, Mass.)

Motor Vehicle Fees and Gasoline Taxes.—By Henry R. Trumbower, Economist, U. S. Bureau of Public Roads. A review of the development of present-day policies in motor vehicle taxation. 9 quarto pp. Views, diagrams, tables. Published in the September, 1924, issue of Public Roads. The gasoline tax appears to be a permanent method of raising money for highway purposes. "It is distinctly a tax for highway service, and, considering the character of the service rendered in return, none of the rates now charged is excessive." (Apply to U. S. Bureau of Public Roads, Washington, D. C.)

The Sanitary Control and Operation of Tourist Camps.—By George W. Simons, Jr., S. I., Chief Sanitary Engineer, State Board of Health. Published by the Florida State Board of Health, Jacksonville, Fla. 1924. 20 pp. Illustrated. Tourist camps in Florida that comply with the regulations of the State Board of Health are publicly approved and certified. This pamphlet explains the standards of the Board, and shows the difficulties that are being overcome. It includes the West Palm Beach ordinance for an automobile tourist camp and regulating it. (Apply to Raymond C. Turck, M. D., State Health Officer, Jacksonville, Fla.)

Politics and Power.—By Guy E. Tripp, LL.D., Chairman of the Board of the Westinghouse Electric & Manufacturing Co. An address delivered before the Westinghouse Club, Wilkinsburg, Pa., October 16, 1924. Endorsing the view that electrical development will be best accomplished by private enterprise under proper governmental regulation and control. (Apply to Westinghouse Department of Publicity, East Pittsburgh, Pa.)

Recreation and Play in Oakland, Calif.—A bulletin of information issued by the Recreation Department of Oakland showing its facilities, activities and plans for the future. Pocket size. 32 pp. Illustrated. Including the provision for municipal golf, archery golf, industrial recreation, recreation centers, etc. Folding chart enclosed showing the interlocking organization of various city, county, national and private recreational agencies. (Apply to the Department.)

Municipal Reports Received

BRAINERD, MINN.—Annual Report, Water and Light Department, year ending June 30, 1924
CHICAGO, ILL.—Annual Report, Mayor, 1924
DULUTH, MINN.—Annual Report, Water and Light Department, 1923
EAST CLEVELAND, OHIO.—Annual Reports of City and of Library, 1923
FITCHBURG, MASS.—Annual Report, Park Commissioners, 1923
IPSWICH, MASS.—Annual Report, Water and Municipal Lighting Commissioners, 1923
MILWAUKEE, WIS.—Report, Common Council, 1923
NEW YORK, N. Y.—Annual Report, Board of Water Supply, 1923
PASADENA, CALIF.—Annual Report, Light and Power Department, year ending June 30, 1924
TACOMA, WASH.—Annual Report, Public Library, 1923
TALLAHASSEE, FLA.—Annual Report of City, year ending February 29, 1924

On the Calendar of Conventions

DECEMBER 1-4.—NEW YORK, N. Y.
American Society of Mechanical Engineers. Annual meeting. Secretary, Calvin W. Rice, 29 West 39th Street, New York, N. Y.

DECEMBER 3.—NEW YORK, N. Y.
National Highway Traffic Association. Annual meeting. President, Arthur H. Blanchard, 1026 East Engineering Building, University of Michigan, Ann Arbor, Mich.

DECEMBER 11-13.—INDIANAPOLIS, IND.
National Society for Vocational Education. Annual convention. Secretary, F. G. Nichols, Harvard University, Cambridge, Mass.

DECEMBER 15-17.—WASHINGTON, D. C.
National Conference on Street and Highway Safety, called by Secretary Herbert Hoover. Address Department of Commerce, Washington, D. C.

DECEMBER 16.—WASHINGTON, D. C.
National Civil Service Reform League. Annual meeting. Secretary, H. W. Marsh, 8 West 40th Street, New York, N. Y.

DECEMBER 26-27.—CHICAGO, ILL.
National Community Center Association. Annual meeting. Secretary, LeRoy E. Bowman, 503 Kent Hall, Columbia University, New York, N. Y.

JANUARY 5-6.—CHICAGO, ILL.
International Association of Street Sanitation Officials. Annual conference. Sceretary, A. M. Anderson, 10 South LaSalle Street, Chicago, Ill.

JANUARY 5-9.—CHICAGO, ILL.
American Road Builders' Association. Annual convention and Road Show. Secretary, Ethel A. Birchland, 37 West 39th Street, New York, N. Y.

JANUARY 12-14.—BOSTON, MASS.
American Society of Landscape Architects. Annual meeting. Secretary, Bremer W. Pond, 18 Tremont Street, Boston, Mass.

JANUARY 19.—NEW YORK, N. Y.
American Institute of Consulting Engineers. Annual meeting. Secretary, P. W. Henry, 111 Broadway, New York, N. Y.

JANUARY 21-23.—NEW YORK, N. Y.
American Society of Civil Engineers. Annual meeting. Assistant Secretary, C. E. Beam, 33 West 39th Street, New York, N. Y.

JANUARY 22.—CHICAGO, ILL.
American Forestry Association. Annual meeting. Executive Secretary, Ovid M. Butler, 1523 L Street, N. W., Washington, D. C.

FEBRUARY 24-27.—DETROIT, MICH.
American Concrete Institute. Annual meeting. Secretary, Harvey Whipple, 1807 E. Grand Boulevard, Detroit, Mich.

A SPEEDY SUCCESS!

2000 Sold in First Few Weeks
The Greatest Record in Truck Industry

FEDERAL-KNIGHT

This speedy truck is helping municipalities to cut haulage costs, increase efficiency and keep well within their appropriations.

Hundreds and hundreds of Federal-Knights now in service all over the world are proving their greater economy and efficiency.

In a few short weeks Federal-Knight has won world-wide recognition as the outstanding value in the light truck field.

This is the *only* truck in the world with a Willys-Knight motor—the motor that *improves with use.* No valves to grind. No carbon-cleaning. 50% saving in upkeep. Amazing economy in gasoline, oil, and tires.

Write for descriptive circular.

FEDERAL MOTOR TRUCK COMPANY
DETROIT, MICHIGAN

FEDERAL-KNIGHT
A SPEEDY BUSINESS TRUCK

News and Illustrations

Items of Interest to City, Town and County Officials, and Others Interested in the Economical Construction and Efficient Operation of Public Improvement Undertakings

Copper Service Pipe

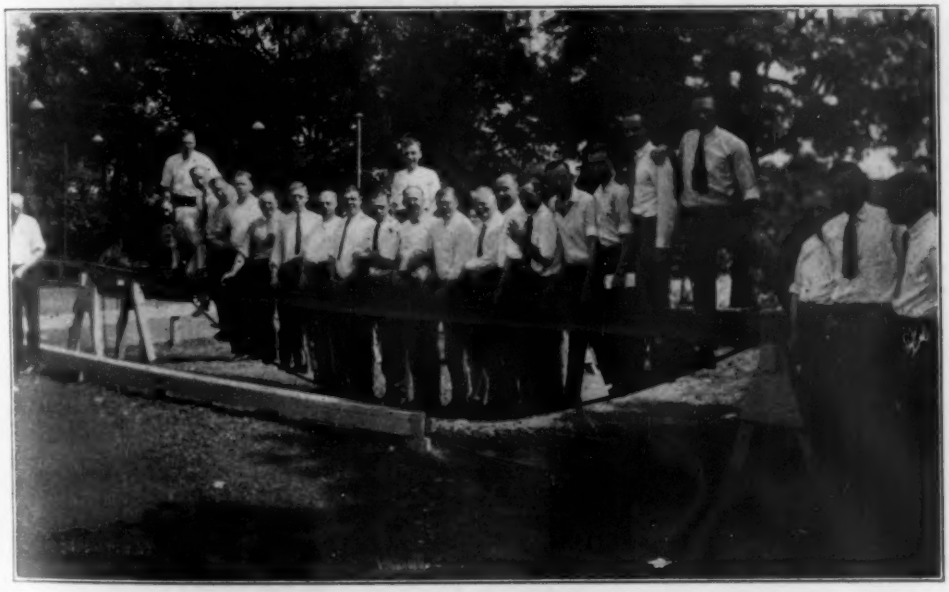
Water service pipe must withstand corrosion from the outside, since they are put where drainage from cinder fills may reach them and this drainage carries sulphuric acid in considerable amounts, and they are therefore liable to be quickly corroded. Again, iron pipe in many districts is subject to either corrosion or scaling inside, resulting in reduced area and ultimate failure. Extensive studies have been made of the value of copper pipe in resisting corrosion, which have shown universally that it is a valuable accession to water-works service pipes. Because of this, the Mueller Company, Decatur, Ill., has developed Mueller copper service pipe in sizes which replace iron service pipe from ½ to 2½ inches in diameter. These sizes are as follows:

I.P.S.	O.D.	Gage BWG	Test Pressure Pounds
½-inch	⅝	18	1,140
¾-inch	⅞	16	1,040
1 -inch	1⅛	16	780
1¼-inch	1⅜	16	630
1½-inch	1⅝	15	580
2 -inch	2⅛	14	520
2½-inch	2⅝	14	420

In the tabulation above are shown the outside diameters and gage of the copper pipe, as well as the test pressure. The inside diameters of the copper pipe are approximately equivalent to the iron pipe sizes, and the test pressures are one-fourth of the bursting pressures.

Since in some localities water or gas service pipe may be run in the same trench with the sewer pipe, though at a much higher level, and the trench may not be dug with a bench for the water-line, provision must be made for the settling of the pipe as the fill settles. This is usually taken care of with lead goosenecks, which serve perfectly with iron-size pipe. It has been found that with copper tube the line should be run directly from the main without any protection other than the ability of the tube to bend and stretch. The accompanying illustration shows one of the many tests which have been applied to this pipe.

A patented connection has been developed for use with Mueller copper pipe that makes possible the use of this service pipe under all conditions. The contact between the nut, copper pipe and spud is a line contact, thereby confining to a small area the total pressure exerted by tightening the nut, and thus tremendously increasing the pressure per square inch at the contact point, which results in a positive joint. Furthermore, this line contact reduces slightly the thickness of the pipe at that point, leaving the pipe its original thickness at the



NINETEEN MUELLER SALESMEN, COMBINED WEIGHT 3,440 POUNDS, STANDING ON COPPER SERVICE PIPE WITHOUT CAUSING A LEAK AT THE JOINTS

Built for its job

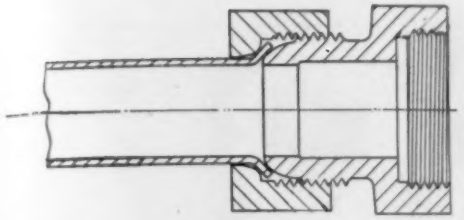
THERE is an International Truck for every job and it is built for its job and built right. In twenty years of truck manufacture the Harvester Company has learned, not only how to build good trucks from the basic design through to final details, but how to fit them exactly for the hauling they are to do. International Trucks are made in six different capacities with wheel base and body equipment determined by the work for which the truck is to be used. International Trucks are serving their owners faithfully in every job imaginable. Called on for the hardest kind of work, they deliver it. You can expect the same of every International and you will not be disappointed. By standing up to severest service they are living up to a reputation — a reputation earned by other products of the Harvester Company for almost a hundred years.

International Heavy-Duty Trucks are built in 3000, 4000, 6000 and 10,000 pound maximum capacities with bodies to meet every requirement. There is a Special Delivery of 1500 pounds capacity and a sturdy Speed Truck for loads up to 2000 pounds. Motor Coaches are supplied to meet every passenger transportation need. Upon request we will gladly supply you with information desired on any models, and the address of the nearest showroom where the full line is on display.

INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(INCORPORATED)

606 So. Michigan Ave. Chicago, Ill.

INTERNATIONAL
HARVESTER
TRUCKS
COMPANY



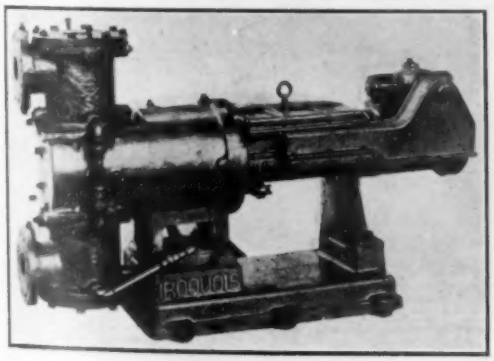
PATENTED CONNECTION FOR COPPER SERVICE PIPE

end, thus causing tremendous resistance against breaking the joint by pulling the tube out endwise. When a joint is made, it is only necessary to first cut the copper service pipe with a hacksaw to the length to be used, taking ordinary care to keep the cut fairly square. Then the small burr left by the saw is reamed out. This can be done with a scraper or pocket knife if desired. The coupling nut is then placed on the pipe, as this cannot be done after the pipe is flared out. The flanging tool is then oiled and inserted in the pipe. The exposed end of the flanging tool should be struck four or five fairly hard blows with a hammer or until the end of the pipe touches the recessed shoulder in the flanging tool. The flanging tool is then removed and the coupling connected, pulling the nut up tight and then loosening it slightly and pulling it up tight again. This completes the joint.

A Steam-jacketed Asphalt Pump

The increasing use of tank cars for the shipment of asphalt has created a demand for a simple asphalt pump with few wearing parts and one that can be operated without skilled attention. After a series of tests extending over a period of one year, the Barber-Asphalt Company, Philadelphia, Pa., is offering the new Iroquois steam-jacketed asphalt pump.

The manufacturers claim that this pump has the following distinctive features which insure long life and economy of operation; a minimum number of wearing parts in contact with the asphalt; large wearing surface to reduce wear; large, straight passages for asphalt, instead of narrow, crooked passages; simplicity of construction to insure low cost and maintenance; ease of operation with minimum of attendance; steam jackets covering all moving parts and packing, so that the pump can be started or stopped at will without clearing out, accessibility of all wearing parts, and absence of springs or other small, easily broken parts in the valve chambers on account of passing foreign matter, pieces of barrel staves, small pieces of metal, stone, sand, coal or other objects which sometimes get into the asphalt when it is allowed to flow over the ground.



STEAM-JACKETED ASPHALT PUMP

This pump is of the reciprocating type, having a single-acting plunger, which was adopted because it led to simplicity of construction and to placing wear on the plunger rather than on the piston rod. The ball type of valve was adopted because it obviates the necessity of springs within the valve chamber, provides the maximum possible amount of wearing surface, and large and straight passages for asphalt, permits the passage of large pieces of foreign matter, and reduces the number of wearing parts in the valve chamber to a minimum. The valve assembly is so designed that by removing the flange directly over the upper ball, both valves with the seats and cages can be removed through the top of the pump without disturbing any other part of the pump or its piping.

Steam jacketing is one of the essential features of the pump. The steam jackets cover all parts of the asphalt end, including the valve, the plunger and the plunger packing. With steam in the jackets, the pump can be stopped for an indefinite period without the necessity of blowing out or otherwise removing the asphalt in the pump chamber. The asphalt may be allowed to cool and solidfy in the pump chamber, and the pump may be started again by filling the jacket with steam until the asphalt is liquid.

The Iroquois steam-jacketed asphalt pump is furnished in three sizes, of 50, 100, and 200 gallons per minute. The materials entering into the construction of the pump are as follows: the steam cylinders are of close-grained iron; the piston rod is of steel; the plunger is of close-grained gray iron; the two ball valves are of bronze and are hollow; the asphalt valves and cages are of cast iron; the valve cage separator is of cast steel. All steam-jacketed parts are of special cast iron, jacketed with 150-pound hydraulic and 175-pound steam pressure in the jackets.

Fairchild Aerial Surveys, Inc.

The Fairchild Aerial Camera Corporation, 136 West 52nd Street, New York City, has announced that its aerial survey business has grown to such an extent that a subsidiary corporation has been formed to more effectively expand this branch of the business. The new corporation will be known as Fairchild Aerial Surveys, Inc.

Another subsidiary corporation has been formed to own and operate the aeroplanes formerly owned by the Fairchild Aerial Camera Corporation and will direct operations involving contracts for flying of every description. This new corporation will be known as the Fairchild Flying Corporation.

The Fairchild Aerial Camera Corporation will continue to manufacture cameras, instruments and aeronautical equipment and will continue as the controlling corporation to finance and manage the new subsidiaries above mentioned in addition to the Fairchild Aerial Surveys (of Canada) Ltd.

ERIE BOULEVARD
Schenectady, New York
Property values advanced from fifty to one thousand dollars a foot on completion of this installation..
KING MANUFACTURING CO
ORNAMENTAL LIGHTING STANDARDS
230 South Clark St. Chicago USA

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

A SECTION OF THE TEST GROUNDS OF THE GENERAL MOTORS TRUCK COMPANY, SHOWING GRAVEL ROAD AT RIGHT

Extensive Testing Ground for Motor Trucks

A GMC 2½-ton truck is to be kept constantly at work maintaining the 6 miles of gravel testing road on the new General Motors proving ground, according to a recent announcement of the General Motors Truck Company, Pontiac, Mich. This new proving ground, which is centrally located between Lansing, Pontiac, Detroit and Flint, where the main automobile and truck factories of General Motors are situated, contains 1,125 acres of land and more than 8 miles of gravel and concrete highways which are used for proving General Motors machines under actual operating conditions.

The GMC truck which has just been put in operation is equipped with a scraper and other road machinery for work during the summer and will operate a snow-plow to keep the testing grounds clear throughout the winter.

Van Gorder Succeeds Reagan

The Neptune Meter Company, 50 East 42nd Street, New York City, has announced the appointment of J. R. Van Gorder, formerly New York representative, as Eastern Sales Manager. Mr. Van Gorder takes the place of the late John F. Reagen, Jr., well known in this position and as the late President of the American Water Works Manufacturers Association, which manages the exhibits at the water-works conventions.

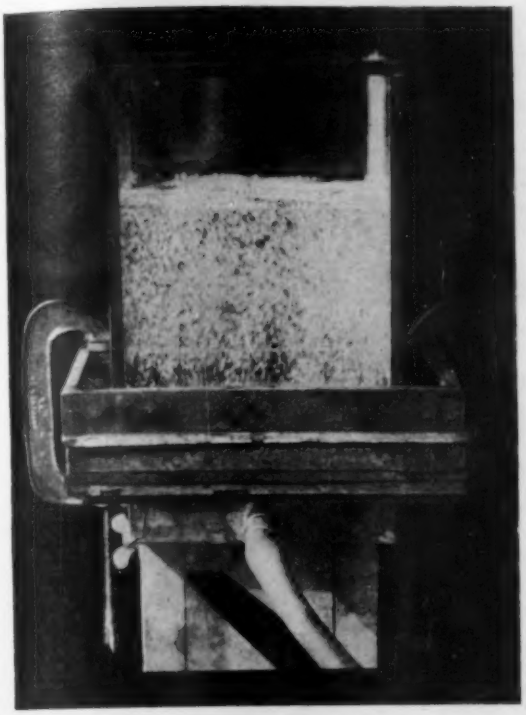
Mr. Reagan was formerly with the Consolidated Water Company of Utica. He entered the office of that company as clerk in 1900, and rose rapidly to the general managership. In 1910 he left the water company and became associated with the Neptune Meter Company of New York City.. In April, 1920, he was made Eastern Sales Manager, and he held this position at the time of his death. and he held this position up to the time of his death.

A New Park Swing of Heavier Construction

A new swing which is of somewhat heavier construction than is customary and which is designed to meet the requirements of parks and playgrounds, has recently been produced by the Bausman Manufacturing Company, Millersville, Pa. The basic principles of construction follow those found in the original Bausman steel swing, which has been in use for more than a quarter of a century. Heavier construction throughout, however, provides the sturdiness required in public parks, playgrounds and recreation centers. The swing is shipped in two sections which are easily joined together, thus erecting a substantial piece of equipment. All of the metal parts are finished with green enamel, and the wood is natural, with two coats of weather-proof varnish. The main frame is made up of 1½ x 1½ x 3/16-inch steel angles, the suspension frame of 1½ x ¼-inch flat steel, and the seat is 30 inches wide.

A STURDY SWING FOR PUBLIC PARKS

Grand Boulevard, Chicago,
five hundred concrete lighting standards installed by the South Park System to beautify and reduce maintenance cost.
Post Designed and Manufactured by
CHICAGO CONCRETE POST CO.
Lawrence, Lamon and Leland Avenues
CHICAGO, ILL.



STANDARD POROUS PLATE PASSING 40.5 CUBIC FEET OF AIR PER MINUTE

Porous Plates for Sanitary Works

A thorough study of the conditions to be met and the requirements of sanitary engineers engaged in the treatment of sewage by the activated sludge process, has resulted in the production, by the Research Department of the Norton Company, Worcester, Mass., of a uniformly porous, acid-proof air-diffusing medium and filter plate of considerable strength. These Norton porous plates are composed of electrically fused alumina grains, bonded together in the kiln with an aluminous glass. This ware is practically unaffected by acids, or neutral and slightly alkaline liquors, according to the manufacturers, and is therefore well adapted to sewage work.

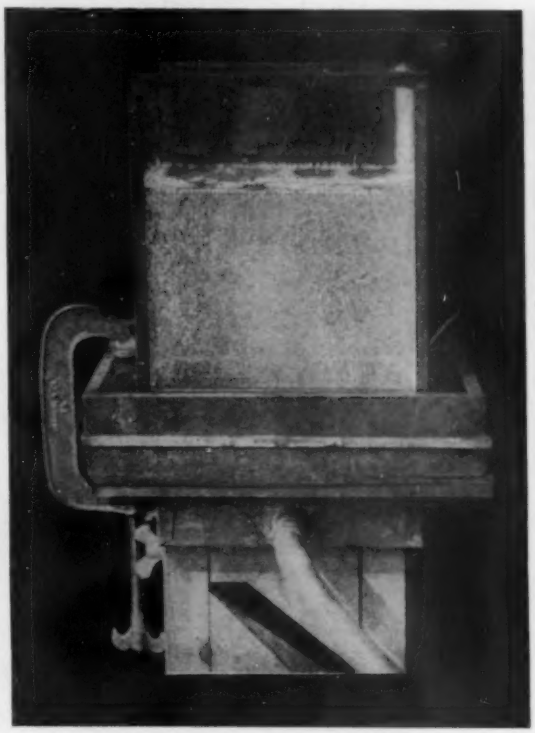
Examinations of the structure of these porous plates with microscopes show their homogeneous composition. All grains are angular and are joined together at the point of contact with an aluminous glass bond, each grain being covered by a vitreous coating. The plates are made in three standard grades—coarse, medium and fine. The coarse grade plate contains comparatively large pores uniformly distributed over the entire area of the plate and offers the least resistance to the passage of gases or liquids. The medium grade has pores smaller than the coarse grade, but, as in all the plates, pore distribution is uniform throughout the entire plate. This grade is used for diffusing air, as in the activated sludge process of sewage treatment and for diffusing various gases when rapid aeration, agitation or absorption is desired. The fine grade contains the largest number of pores, but they are of smaller size and are also uniformly distributed. This grade is used for diffusing air and gases in small streams of minute bubbles.

The porous plates are made 12 x 12 x 1 inch, as this size has been found most suitable for installations. When air starts up through a water-saturated plate it must first lift practically all of the water in the plate to its surface before any of the air escapes through the plates. This means that the initial resistance of a water-saturated plate to the passage of air is greatest at the start.

Norton porous plates are furnished for both the ridge and furrow and the Manchester types of activating plants for sewage treatment, as well as for any modifications of these types. Since thorough control is maintained over the grain size, the plates can be supplied at various porosities, but in each and every case pores are uniformly distributed through the entire body of the plate. A foot-square plate with fine pores contains a larger number of pores than the same size plate containing large pores. The accompanying illustrations show two standard-size, 12 x 12 x 1-inch plates passing 4.4 cubic feet of air per minute and 40.5 cubic feet per minute respectively.

Union Water Meter Company Opens New York Office

The Union Water Meter Company, Worcester, Mass., has opened a New York office at 452 Hudson Terminal Building, 50 Church Street, New York City. Edward W. Jacobs, for the past ten years representative of this company in the New York territory, will be in charge. The Union Water Meter Company was organized in 1868 and manufacturers water-meters of several types.



POROUS PLATE PASSING 4.4 CUBIC FEET OF AIR PER MINUTE

Champion Snow Plow

Can You Afford to be without a Champion Snow Plow?

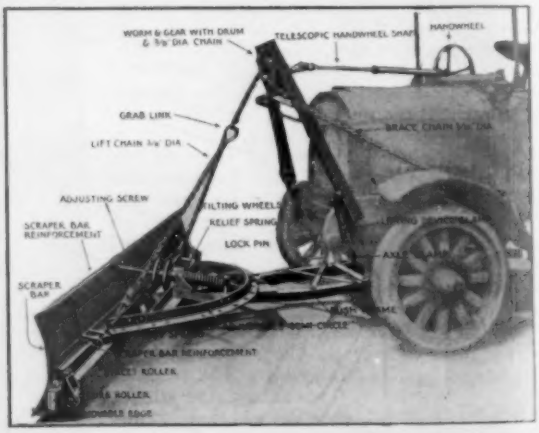
Not when indisputable evidence shows that it will save its cost after one big snow storm.

Keeps the wheels of traffic turning by moving snow quickly and economically from city streets or country roads

Champion Snow Plow attached to a White Truck —can be quickly attached to any standard truck

Showing details of construction of Champion Snow Plow

Ask for Snow Plow Catalog

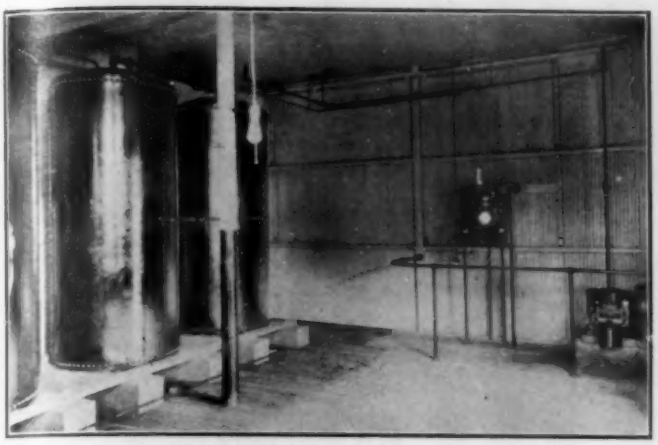


The GOOD ROADS MACHINERY CO.

KENNETT SQUARE, PA.

NEW YORK, N.Y.:- 50 Church Street
WATERTOWN, MASS.:- 36 Pleasant St.
CHICAGO, ILL.:- 49th and Halstead Sts.
PITTSBURGH, PA.:- 1523 Oliver Bldg.

Champion Snow Plow



MIDDLETOWN, CONN., AIR WHISTLE INSTALLATION
The air tanks are shown at the left, the control board at right center, and the motor compressor at the extreme right

Recent Fire-Alarm Improvements

The great increase in the practice of factories buying their power from an outside source instead of maintaining a steam pressure is resulting in fewer steam fire whistles and in the installation of a very considerable number of diaphones and air whistles made by the Gamewell Co., Newton Upper Falls, Mass. Lyons, N. Y., has recently installed a diaphone, and with it a number of boxes, a transmitter and switchboard. Woodland, Calif., has installed a new diaphone and a number of boxes and overhauled all of its existing line construction. Middletown, Conn., where they desire to obtain the use of a whistle, has installed compressed air tanks for the operation of the whistle.

The next three months will be the most dangerous in the year for schoolhouse fires, and to meet this condition, Needham, Mass., has installed in its new high school a complete fire-alarm system which is connected directly to the city circuit.

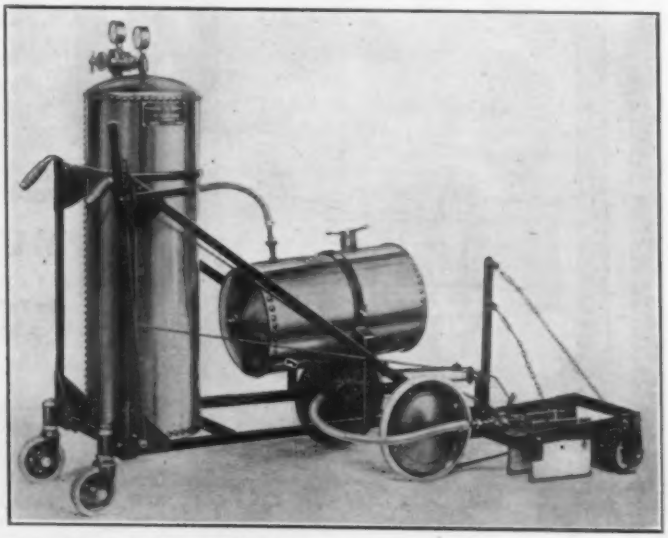
Levison Heads Blaw-Knox Road-Building Department

The Blaw-Knox Company, Pittsburgh, Pa., has announced the appointment of Arthur Levison, Highway Engineer, U. S. Bureau of Public Roads, as chief engineer of the road-building department of the company. Mr. Levison has been successively Inspector of Road Construction of the New York State Highway Department; Assistant Engineer of Barge Canal Construction, New York State; Assistant Engineer, Subway Construction in New York City; Engineer in Charge of Reinforced Concrete Building Construction at the Washington Navy Yard, and since 1919 has been connected with the U. S. Bureau of Public Roads in the capacity of Highway Engineer, cooperating with highway departments of the Middle West in the design, construction and maintenance of all types of highway improvements. His most recent work has been in connection with conducting a research on concrete pavement construction. In his new position with the Blaw-Knox Company he will assist in improving the design of its road-building equipment, cooperating with engineers and contractors to make it possible to build better roads more economically and to develop new apparatus for road work.

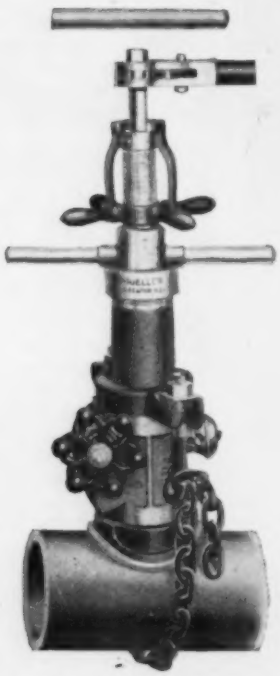
Painting Traffic Lines by Machine

A new device for the rapid painting of the lines required for the regulation of vehicle and pedestrian traffic on roads has been brought out under the name "Ault Traffic Line Marking Machine" by the Tennessee Tool Works, Inc., Knoxville, Tenn. This machine lays an average of 200 lineal feet per minute, 3 to 8 inches wide, giving a uniform and distinct line, either curved or straight, and is operated by one man. The machine weighs only 160 pounds. The entire device is mounted on roller bearings, is rubber-tired and has disc steel wheels. Compressed air forces the marking material between specially designed shields and wiper brushes, and all surfaces to be painted are cleaned in advance by a revolving brush.

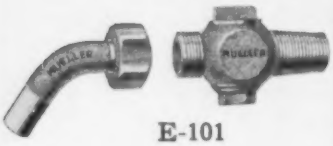
Actual tests indicate that one machine will do the equivalent of the work of twelve to fifteen painters using a hand brush, and it also permits the use of quick-drying paints. The machine practically dispenses with the need of night painting. Extra attachments are provided for spraying fire-plugs, posts, guard-rails, underpasses, etc., and also the direct spraying of letters, arrows, etc., on stencils. The air supply is obtained from a service station once each day.



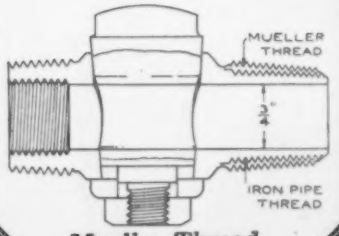
NEW UNIT FOR MARKING TRAFFIC LINES ON STREETS



"B" Tapping Machine



E-101



Mueller Thread

Good Tools Proclaim the Good Artisan

"I can always tell a good workman by the tools he uses," wrote a well-known sanitary engineer, recently.

He meant to infer that good work can be done only with good tools and that the careful artisan would not use old style or worn tools.

Nowhere is this more apparent than with a tapping machine. A worn machine cannot do a satisfactory job.

Even if your tapping machine is a very old one, you can get a big allowance on it by turning it in on a new Mueller machine, which will make taps one-half to one inch and insert corporation taps in mains under pressure.

This proposition enables you to have a new Mueller tapping machine on a very small investment. Let us give you full particulars of our "trade in" plan.

MUELLER CO.

DECATUR, ILL.

New York San Francisco Los Angeles

Jobbers in all Principal Cities

VARIOUS USES OF HAISS WAGON LOADERS, AS DESCRIBED IN TEXT

Creeper Loaders in Municipal Work

The accompanying illustrations show the use of Haiss creeper wagon and truck loaders in various types of municipal work, and portray the variety of legitimate services which these machines can render.

Frenzel Brothers Company, Chicago, Ill., use two Haiss creeper loaders for excavating alleys for paving. The material handled is sand, ashes and soil, generally spoil from adjacent cellar excavations. The alleys are loosened with a rooter plow, which shows up any rocks that need individual attention, and also culverts, ducts and other pipes. The loader goes along the middle of the alley, which may be from 9 to 16 feet wide, and laborers throw the material from the sides into the path of the feeding propellers. Trucks of 4 and 6 yards capacity back under the loader to receive the material, and drive out. In one period of 28 minutes total elapsed time, 40 yards were placed in trucks, with one loader.

Rogers & Monroe, Muskegon, Mich., use a creeper loader for excavating streets. The soil is principally sand, and unless there is an old macadam surfacing, the street is not even scarified or plowed. The force used to operate the loader consists of the operator, the grading foreman, and one laborer. The material is loaded into 1¼-yard Ford trucks, running alongside the loader. The average output for the summer of 1924 was 290 cubic yards per day, measured in excavation. The average gasoline consumption was 15 gallons per day. Between 15 and 18 trucks were used on an average haul of 1¼ miles.

New Orleans Public Service, Inc., uses a loader for removing old shell and clay ballast in track reconstruction. The operation of the machine is very satisfactory when the ballast is dry, but it is necessary to clean out the bucket and spout from time to time when the clay is damp. Even in damp material there is a saving over hand labor. The creeper loads into a separate belt conveyor which puts the material in trucks and cars. A

Release your city

SNOW BLOCKED streets are a brake on community progress. They paralyze traffic —check public and private advancement. Life and property are not safe! Ambulances and fire engines cannot reach their destinations. Fuel cannot be delivered. Prosperity wanes! Business is unsatisfactory. Buyers and employees are unable to reach shopping centers.

Snow Removal Pays For Itself

CITIES throughout the snow belt are finding that snow removal pays. The experiences of those cities which are using Best Tractors to clear snow blocked streets has proven this beyond a doubt.

Write for literature on snow removal.

C. L. Best Tractor Co.

General Offices—Factory San Leandro, California

See the Best Tractors at the Chicago Road Show in January

93-1224

Factory Branch-Warehouse
St. Louis, Missouri

SALES OFFICES

SAN FRANCISCO
127 Montgomery St.

NEW YORK CITY
50 Broad St.

BEST TRACTORS

40-yard work train has been loaded in 50 minutes working time, and in one 8-hour day 112 wagons of 2 yards capacity were loaded.

C. J. Mallet, Inc., Bronx, N. Y., uses Haiss creepers in his material yards. In February, 1924, he took one of them out for a snow-removal job, and for a week or more he put up 8-yard loads with it in 3½ minutes. The force consisted of the operator and of two shovelers to clean up outside the propellers.

New P. & H. Representatives

The Pawling & Harnischfeger Company, Milwaukee, Wis., has announced the appointment of H. L. Mode as a sales representative of the Eastern territory with headquarters at New York and Philadelphia. Mr. Mode has had ten years of experience with overhead electric traveling cranes, as well as seven years' experience in the motor department of the General Electric Company. He will specialize in problems of electric traveling cranes.

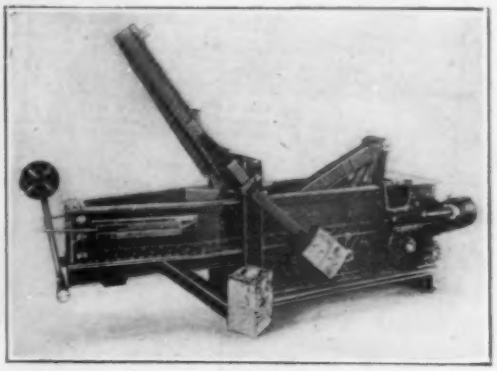
The appointment of N. P. Farrar as Assistant Sales Manager has also been announced. Mr. Farrar has been District Manager of the Philadelphia territory until recently and has had considerable experience with overhead electric traveling cranes, hoists and gasoline-powered excavators.

Fire Pump Mounted on Auto Running-Board

The accompanying illustration shows an Evinrude high-pressure pump mounted on the running-board of a Locomobile belonging to the Placerville, Calif., Fire Department. This outfit, which is similar to one in use at Oakdale, Calif., carries a 250-gallon tank of water and is connected with a relief valve. It is also rigged with an electrical starter which is chain-driven.

The pump unit is 31 inches long, 11½ inches wide and 17 inches high and weighs only 105 pounds. At a head of 277 feet, or through 1⅛ miles of 1½-inch pipe, the pump can deliver 1,500 gallons per hour. At 120 pounds pressure it throws a 100-foot stream through a ⅜-inch nozzle. The pump is of special design, internal gear type, with extra-long bearings to insure freedom from wear or leakage. The power-plant is directly connected to the pump shaft by an Oldham coupling.

The engine is an Evinrude 4-5 horse-power, 2-cylinder, equipped with an Evinrude magneto built in the fly-wheel. The standard equipment includes, besides the magneto and starter, a float carburetor, a pressure-gage, an aluminum base with gasoline tank, and the necessary tools for adjustments which may be necessary for the engine or pump.

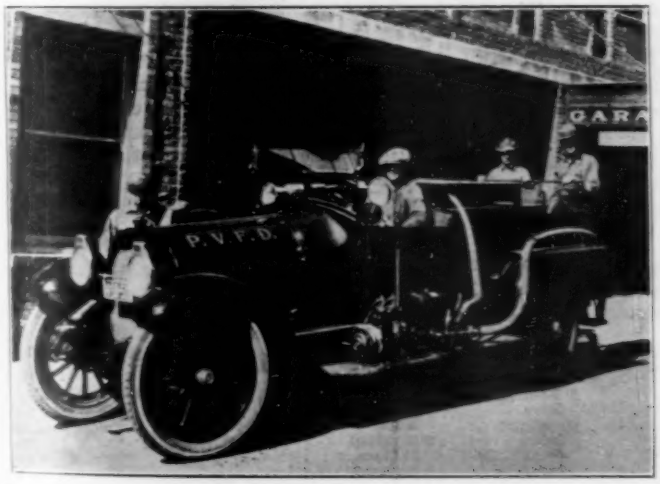


STURDY BALING EQUIPMENT

Saving Money by Baling Metal Refuse in Washington

The disposal of waste tin cans and other metal refuse collected by the City Refuse Division of the District of Columbia has become a profitable undertaking through the use of the baling press illustrated herewith. This machine, which is manufactured by the Economy Baler Company, of Ann Arbor, Mich., was installed in Washington, D. C., about five years ago and has given very satisfactory service since that time.

By the use of this motor-driven baler, from 200 to 300 bales of scrap metal are produced daily. These bales measure approximately 10 x 12 x 18 inches and weigh about 40 pounds each. The actual operation of the press requires the services of two men, and an average of four men daily are employed to pick out the waste tin cans, etc., from the conveyor belt for feeding to the machine. During the past fiscal year a total of 3,033,060 pounds of scrap metal was compressed and baled by this method, with a resultant value of $7,888.60. The cost of labor for picking the material and the operation of the press during the year is estimated to have been in the neighborhood of $5,130.



HIGH-PRESSURE FIRE PUMP MOUNTED ON RUNNING-BOARD OF TRUCK

A CORRECTION

In the article on "Results of November Election Referenda," on page 613 of this issue, the third item should be credited to the state of Missouri, instead of to Michigan as printed. The Michigan item which appears sixth in the compilation is correct.

KEOKUK STREETS STAND TEST of TIME

CAMERON, JOYCE & Co.
RAILROAD AND GENERAL CONTRACTORS
KEOKUK, IOWA

October 25,

The Standard Oil Company of Indiana,
Chicago, Illinois.

Gentlemen:-

We have used your Stan-O-Lind Paving Asphalt in the City of Keokuk for twelve years and have had good results with all of the paving on which we have used same.

We have paved upper Main Street, South 8th Street and Exchange Street from fourth to fifth and these streets are in very good condition today.

Yours very truly,

CAMERON, JOYCE AND COMPANY

By Thos H Joyce
President

THJ:V

Scene on Upper Main Street, Keokuk, Iowa, where Stanolind Paving Filler was applied many years ago. The filler has given excellent results on this street.

Good after Twelve Years Service

OUT in Keokuk, Iowa, Stanolind Paving Asphalt has been used for the past twelve years and in every instance it has given entire satisfaction. The picture above shows a section of Upper Main street (brick with Stanolind Asphalt Filler). This same product has given equally as satisfactory results at hundreds of other points throughout the country.

Stanolind Paving Asphalt, properly used, will give greater service and satisfaction, per dollar cost, than any other high class paving that can be used. This fact has been demonstrated repeatedly.

And at the time initial cost is considered, thought should also be given to the maintenance cost. In the case of Stanolind Paving Asphalt the latter is surprisingly low, as streets paved with it, in many cases, serve ten years without requiring any repairs whatever.

Check the record of any street constructed of Stanolind Paving Asphalt; the traffic it carries; the cost of construction and its upkeep, then compare these figures with like figures on any other type of paving. You'll see then why Stanolind Paving Asphalt has constantly grown in popularity with those who strive for the best roads. It is a plain case of dollars and sense.

Ask for this free booklet

If you are interested in formulating a constructive street or road building program for your town, city or county, we invite you to communicate with our staff of efficient, experienced road engineers. They will be pleased to co-operate with you and give you the benefit of their advice.

This service is rendered free of charge and it places you under no obligation whatever to us.

STANDARD OIL COMPANY
(INDIANA)

General Offices: 910 S. Michigan Ave., CHICAGO, ILLINOIS

ILLINOIS Chicago Decatur Joliet Peoria Quincy	INDIANA Evansville Indianapolis South Bend KANSAS Wichita	IOWA Davenport Des Moines Mason City Sioux City	S. DAKOTA Huron MICHIGAN Detroit Grand Rapids Saginaw	N. DAKOTA Fargo Minot WISCONSIN La Crosse Milwaukee	MINNESOTA Duluth Mankato Minneapolis	MISSOURI Kansas City St. Joseph St. Louis

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

Easily Installed

Cast Iron Pipe

is easily handled and may be quickly and cheaply installed.

Man power alone is needed to lower the smaller pipe into the trench, and for the larger sizes a simple form of crane is sufficient.

In the trench, the bell and spigot joint is easily made up. It is the standard for water installations, and all water works superintendents will vouch for its permanence.

Good for Centuries

United States Cast Iron Pipe & Foundry Co.

General Office, Burlington, New Jersey

SALES OFFICES:

Philadelphia, 1421 Chestnut St.
Pittsburgh, Henry W. Oliver Bldg.
New York, 71 Broadway
San Francisco, Monadnock Bldg.
Chicago, 122 S. Michigan Blvd.
Birmingham, 1002 American Trust Building
Kansas City, Mo., Interstate Bldg.
Minneapolis, Plymouth Bldg.
Cleveland, 1150 E. 26th St.
Buffalo, 957 E. Ferry St.
Dallas, Magnolia Bldg.

Index to Contents of This Issue, Page 73
Index to Advertisements, Page 132

These Catalogs Can Help You

THE AMERICAN CITY should always be mentioned when writing for this material which is furnished free of charge. Officials who check over these items each month and write for such printed matter as interests them will find this a convenient way of keeping their information files up to date.

MOTOR TRUCKS FOR ALL SERVICES
The great range of duties which falls to the lot of a municipal truck chassis demands a truck of peculiar fitness for every job. Just how GMC trucks fit into this type of work is told in the GMC catalog, which may be secured from Dept. 19, General Motors Truck Co., Pontiac, Mich.

HOW TO REDUCE TRAFFIC ACCIDENTS
The Esseo Mfg. Co., 110 Harrison St., Peoria, Ill., will be glad to send to any interested municipal officials or civic organizations its literature telling how traffic accidents can be reduced through the use of Esseo "Stop and Go" units.

THE OILED ROADS OF LONG ISLAND
This is the title of an illustrated booklet recently issued by the Asphalt Sales Dept. (W. H. Kershaw, Mgr.), The Texas Co., 17 Battery Pl., New York City, describing and depicting the many miles of oiled roads on Long Island which are serving the heavy traffic in that district.

A BIG SNOW-REMOVAL JOB
In a 4-page illustrated folder, the C. L. Best Tractor Co., San Leandro, Calif., tells the story of the practical application of Best tractors and snow-plows for the removal of snow blockades, with particular reference to one of these tractors that worked to an elevation of 14,000 feet through 6-foot drifts.

REAL SPORT ON PLAYGROUNDS
The 1924 catalog of the Patterson-Williams Mfg. Co., 501-507 W. San Fernando St., San Jose, Calif., describes a wealth of ingenious playground apparatus which is safe and which provides an abundance of amusement for youngsters of all sizes and ages.

HOW MUCH FREE CHLORINE IN WATER?
Through the use of an inexpensive testing outfit, described in Technical Publication No. 54, issued by Wallace & Tiernan Co., Inc., Newark, N. J., waterworks officials are able to make a very quick, accurate and easy test for free or residual chlorine in water.

TRAFFIC SIGNAL SYSTEMS
Folder No. 14, issued by Crouse-Hinds Co., Syracuse, N. Y., depicts typical installations of this company's traffic control units under all conceivable conditions. Bulletin 213-AC contains a more complete description of the individual units.

A BLEEDER FOR TREATED WOOD BLOCKS
The Chausse Oil Burner Co., Elkhart, Ind., has just brought out a new squeegee machine for the forced bleeding of tarred and creosoted block floors and pavements. This machine is described in literature which may be secured free on request.

PLANE TABLE SURVEYS
W. & L. E. Gurley, Troy, N. Y., have published a particularly interesting bulletin PT-155 on the subject of plane table surveys. The increasing use of this very versatile instrument, which practically produces its maps as the survey progresses, makes it worth the study of every city and park official.

A BACK-FILLER ATTACHMENT FOR TRACTORS
A Bull-Dozer or trench back-filler adapted for attachment to 5- and 10-ton tractors, is described for municipal officials and contractors in a leaflet issued by the LaPlant-Choate Mfg. Co., 3015 First Ave., Cedar Rapids, Iowa.

SCHOOL TELEPHONE AND FIRE-ALARM SYSTEMS
In Booklet No. 14800A, the Holtzer-Cabot Electric Co., Boston, Mass., gives a great deal of helpful information relative to the requirements of school telephone systems, with detailed descriptions of the different units necessary. Booklet No. 16304A describes school fire-alarm systems.

EFFICIENT LAWN-MOWING EQUIPMENT
The Coldwell Model "L" motor mower for the even and speedy cropping of lawns around municipal buildings, in parks, playgrounds, and golf courses, is described in literature which may be secured free from the Coldwell Lawn Mower Co., Newburgh, N. Y.

SEWAGE SCREENS AND GATES
The Sanitation Corp., 165 Broadway, New York City, in its new Bulletin G-9 describes recent improvements in the design and construction of its fine screens, particularly the curved slot plate which permits finer slots, better cleaning, increased capacity, and the higher removal of solids from sewage.

CONCRETE LIGHTING STANDARDS
Concrete lighting standards, 5,000 of which have recently been selected by the city of Chicago for use in that city, are described in the literature of the Chicago Concrete Post Co., Paul K. Fleming, President, Lawrence, Lemon and Leland Avenues, Chicago, Ill.

PROFITS AND BETTER SERVICE FOR POWER-PLANTS
The value of Fulton-Diesels in municipal power-plant works, as shown in many installations, is told in the literature of the Fulton Iron Works, St. Louis, Mo.

HOW TO REMOVE SNOW
The most effective manner of removing snow which has been pushed from the center of the street towards the gutters is to employ an effective loading machine such as is described in the literature of Barber-Greene Co., 515 W. Park Ave., Aurora, Ill.

MOTOR-TRUCK FLEETS FOR CITIES
Information regarding cities which are using Autocar fleets for garbage removal, ash collection and other city services, may be secured from the Autocar Co., Box 2001, Ardmore, Pa.

LONG-LIVED DIESEL ENGINES
Descriptions of the integral parts of the Bessemer diesel engine, each of which is built to insure long life, may be secured from the Bessemer Gas Engine Company, 18 Lincoln Ave., Grove City, Pa.

CUT CITY HAULING COST
Descriptions of underbody hydraulic hoists which aid greatly in reducing the cost of dumping ashes, garbage and similar material, may be secured by writing to the Wood Hydraulic Hoist & Body Co., 7936 Riopelle St., Detroit, Mich.

REFRACTORS FOR STREET LIGHTING
The use of refractors as a street-lighting accessory and the particular service of four-way and two-way refractors, are told in a booklet which may be secured from the Holophane Glass Co., 342 Madison Ave., New York City.

NON-SLIPPING FLOORS
The Norton Co., Worcester, Mass., has issued a series of four bulletins describing various non-slipping products for floors and stairways, under the titles: Ceramic Mosaic Tile and Treads; Aggregates; Aggregate Tile Thresholds, Treads and Platforms; Floor and Stair Tile.

MUNICIPAL AUDIT AND BUDGET DATA
Perine & Co., 149 Broadway, New York City, will be pleased to furnish to municipalities complete information regarding its service in making municipal audits, preparing budget data and assisting in the preparation of reports based on investigations.

MISCELLANEOUS MUNICIPAL CASTINGS
Catalog 25 recently issued by the H. W. Clark Co., 1112-1116 Hayes Ave., Mattoon, Ill., contains a great deal of information regarding manhole covers, cistern tops, curb and gutter inlets, traps, and foundation and area grates.

See Additional Items on Page 6

These Catalogs Can Help You

What We Mean By Service

EVERY DOT MEANS A W&T INSTALLATION

THIS map hangs on the wall of our General Office in Newark—a constant reminder to our staff of their responsibility for over six thousand installations of W&T equipment and processes. ¶To keep every one of these installations in constant operation, to instantly respond to calls for expert assistance and to perform with efficiency, dispatch and economy such duties as our customers require—that is the purpose of our nation wide service organization.

"The only safe Water is a Sterilized Water"

TECHNICAL PUBLICATION NUMBER 42 "CHLORINE IN SEWAGE PURIFICATION" WILL BE MAILED ON REQUEST

WALLACE & TIERNAN
COMPANY, INCORPORATED
Manufacturers of Chlorine Control Apparatus
NEWARK NEW JERSEY

These Catalogs Can Help You

You can secure any or all of these catalogs free of charge if you mention The American City

SNOW-PLOWS FOR TRUCKS AND TRACTORS

In Catalog No. 216 the Baker Mfg. Co., 503 Stanford Ave., Springfield, Ill., describes its many types of effective blade and "V" type snow-plows for attachment to trucks and tractors.

ROAD AND ROOFING KETTLES

Specifications and instruction sheets covering Connery's complete line of non-leakable welding road and roofing tar and asphalt kettles may be secured by any interested municipal officials and contractors free on request to Connery & Co., Inc., 4000 N. Second St., Philadelphia, Pa.

AN ELECTRIC TRAFFIC SIREN

The Sterling traffic siren, which gives a clear, distinctive warning when fire trucks are approaching and which is made to be absolutely weather-proof and dependable in service, is described in literature which may be secured from the Inter-State Machine Products Co., Inc., 53 Allen St., Rochester, N. Y.

GRADERS WITH ROLLER-BEARING WHEELS

Austin leaning-wheel graders with Timkin tapered roller-bearing wheels are described in a new illustrated catalog which may be secured from the Austin-Western Road Machinery Co., 400 N. Michigan Blvd., Chicago, Ill.

PUMPS BUILT FOR MOTOR DRIVE

The reason why De Laval centrifugal pumps run so well with synchronous motors is that they have a very low starting torque and can be started by any self-starting type of motor. Other information regarding De Laval centrifugal pumps with horizontally split casings will be found in catalog B-64, which may be secured from the De Laval Steam Turbine Co., Trenton, N. J.

ILLUMINATED TRAFFIC MARKERS

Special electric traffic markers with standard lettering, measuring 22 inches in diameter and 7 inches high, which are mounted entirely above the street surface, are described in literature, which may be secured from the Ohio Traffic Devices Co., 611 N. 4th St., Columbus, Ohio.

CALCIUM CHLORIDE A ROAD PRESERVATIVE

The Carbondale Calcium Co., Carbondale, Pa., has issued an instructive booklet on the use of granulated calcium chloride as a road preservative and dust preventive, which it will be pleased to send to any interested municipal officials.

STREET BROOMS REFILLED

Service and economy with a saving in freight charges in the cost of shipping municipal street-cleaning brooms may be secured by getting in touch with the Kendallville Broom & Brush Co., Kendallville, Ind., or the Lang Broom Co., Pittsburgh, Pa. Prices and literature on refills may be secured from either of these associated companies.

PREVENT INFILTRATION IN SEWERS

The use of G-K compound to prevent infiltration and leakage in sewers is told in facts and figures in a booklet which may be secured from the G-K Sales Agency, P. O. Box 4, Macungie, Pa.

TRIPLE AND QUINTUPLEX MOWERS

Worthington triple and quintuplex lawn-mowers and the Worthington lawn-tractor are described in detail in Bulletin No. 42 which may be secured from the Worthington Mower Co., 452 Fifth Ave., New York City.

POWER-PLANT AND WATER-WORKS STANDBYS

Sterling internal combustion engines, which do away with the worries over coal and the trials of storms and mechanical breakdowns in the operation of water-works pumps and power-plant generators, are described in literature which may be secured from Dept. C-11, the Sterling Engine Co., Buffalo, N. Y.

CHAIN LINK FENCE FABRIC

Complete information about "Galv-After" fence, which affords permanent property protection while adding beauty to the grounds enclosed, may be secured from Dept. 4, Cyclone Fence Co., Waukegan, Ill.

MEDIUM-WEIGHT TRACTORS FOR SNOW REMOVAL

A wealth of information regarding the use of medium-weight Cletrac tractors, made by the Cleveland Tractor Co., Cleveland, Ohio, will be found in the recent literature of this company, which may be secured free on request.

WATER-SUPPLIES FOR SWIMMING POOLS

Bulletin No. 500, which has been issued by the Graver Corp., 690 Todd Ave., East Orange, Ind., contains complete information on recirculating, refiltering, heating and sterilizing swimming-pool water.

FLEXIBLE SEWER JOINTS

Ruberoid Pipe-Seal, which forms a tight flexible joint that will not crack under the strain of settling ground or realignment of the pipe, is described in a folder which may be secured free from the Ruberoid Co., 95 Madison Ave., New York City.

SOLID TIRES THAT CUSHION TRUCKS

Kelly-Kats, which are said to wear as well as, and are better than, other solid tires and give 50 per cent more cushioning and traction than any other type of tire for heavy-duty municipal trucks, are described in literature which may be secured from the Kelly-Springfield Tire Co., 250 W. 57th St., New York City.

SEWAGE EJECTORS AND PUMPS

Municipal officials faced with the problem of low sewer grades and the difficulty of pumping sewage out of low areas to disposal plants or outdoor sewers, should secure the literature of Yeomans Bros. Co., 1417 Dayton St., Chicago, Ill., describing its complete line of sewage ejectors and sewage pumps for handling these problems.

THE USE OF WATER-METERS

Booklet No. 54, which has recently been issued by the Union Water Meter Co., Worcester, Mass., contains recommendations for the proper installation and use of water-meters, together with a complete description of the full line of meters made by this company.

A YOKE FOR WATER-METERS

The Ford meter-yoke, which makes setting or removing a meter a very simple matter, is described in a small illustrated folder which may be secured from the Ford Meter Box Co., Wabash, Ind.

TWENTY-SIX YEARS OF DIESEL ENGINES

The Busch-Sulzer Bros.-Diesel Engine Co., St. Louis, Mo., has just issued a free 96-page book on the development, economy and uses of the Diesel engine. This book is well illustrated with diagrams, plant layouts and photographs of installations and is replete with cost data.

SNOW REMOVAL BY MACHINES

The question of man power or machine power in snow removal is easily answered when the cost is considered. It used to be done slowly by men loading trucks with hand shovels. To-day, by the use of the Champion snow-plow described in "The White Way," a booklet issued by the Good Roads Machinery Co., Inc., Kennett Square, Pa., it is possible to quickly push the snow to the side of the road and have the highway open for traffic at once.

BUSINESS FOLLOWS LIGHT

The Westinghouse Elec. & Mfg. Co., South Bend, Ind., has issued a very interesting folder, "Business Follows Light," which shows the remarkable development possible in any city that is willing to pay $2 a year per capita for adequate street lighting. Copies of this circular may be used by municipal officials to create interest among business men and civic organizations.

VITRIFIED CLAY DRAIN TILE

The value of Dickey vitrified clay drain for removing surplus water from moist subgrades along fine roads and boulevards, as well as its general utility in solving drainage problems, is told in the literature of the W. S. Dickey Clay Mfg. Co., 235 New York Life Bldg., Kansas City, Mo.

A SELF-CONTAINED PATCHER

Literature describing the Merrill patcher, manufactured by Chase & Lyman, Inc., 12 Pearl St., Boston, Mass., may be secured by any contractor interested in an economical unit readily operated by one man and so built that the bottom of the kettle cannot be burned out.

AN ASPHALT CONCRETE PAVING BLOCK

The Keystablock, a well-keyed paving block, 3½ x 4 x 12 inches, made with a surface of asphalt and a base of concrete, is described in the literature of the Keystabond Asphalt Paving Co., Inc., 367 Boylston St., Boston, Mass.

A NEW PONY ROAD ROLLER

In its latest catalog the Acme Road Machinery Co., Inc., Frankfort, N. Y., describes its 5-ton, 4-cylinder gasoline road roller, which has a wheel-base of 97 inches and is powered with a Fordson unit.

MOTOR-CYCLES FOR POLICE SERVICE

Special literature has been prepared on police and motor-cycles, which can be secured free from the Harley-Davidson Motor Co., Dept. M, Milwaukee, Wis.

See additional items on preceding page

MATHIESON Chemicals

To Water Works Officials

IN placing your contract for next year's requirements of liquid chlorine, the most important things for you to consider are the container equipment you will be handling and the service your supplier will render.

Will your cylinders be cleaned and inspected at the works before each refilling? Will they be loaded with *uniform* net weights of 105 and 150 pounds? Will they be equipped with specially constructed valves which can be repacked while there is gas in the cylinders? Has the producer facilities for prompt shipments and an adequate traffic department? Does he carry warehouse stocks in all principal cities for your supply in case of emergency? Has his organization a background of trained engineers and chemists both operating and in the field?

If you specify Mathieson Liquid Chlorine—the gray cylinders with the "Eagle Thistle" label—you can give an affirmative answer to each of these important questions.

The MATHIESON ALKALI WORKS *Inc.*
25 WEST 43rd STREET NEW YORK CITY

PHILADELPHIA
PROVIDENCE

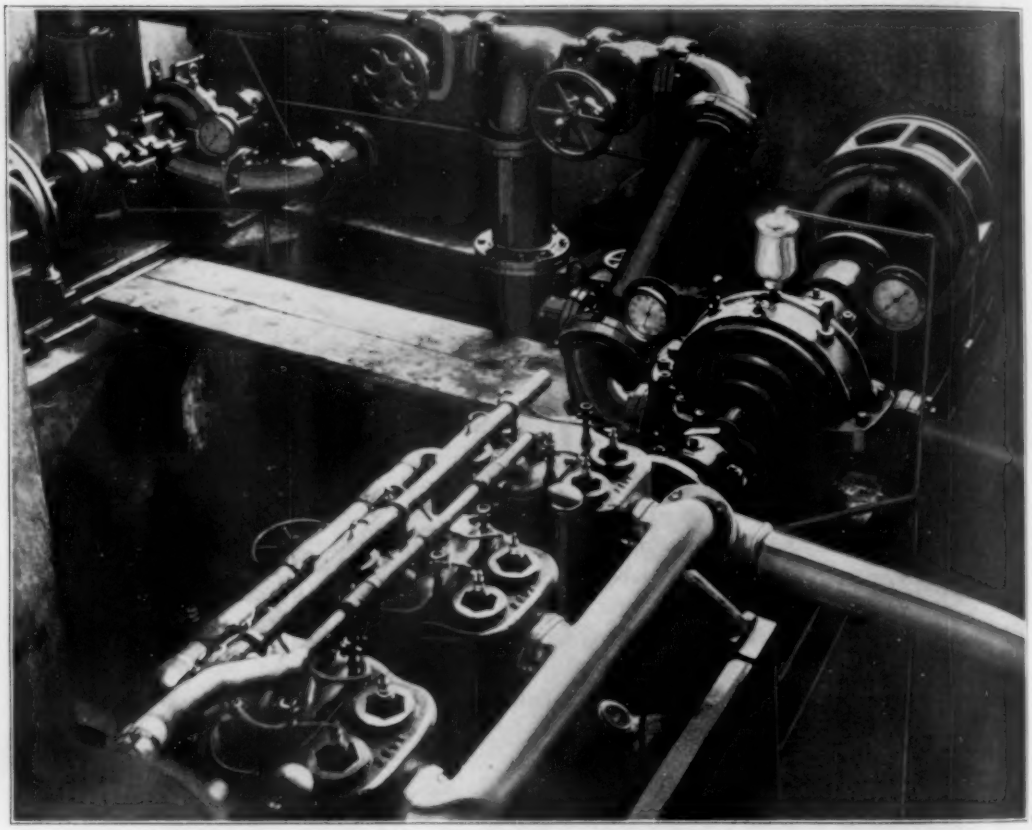
CHICAGO
CHARLOTTE

EAGLE THISTLE PRODUCTS

Deal Direct with the Manufacturer

Bicarbonate of Soda
Liquid Chlorine-Caustic Soda
Sesquicarbonate of Soda
Bleaching Powder-Soda Ash

AMERICAN
AURORA, ILL.



GENERAL OFFICES *and* WORKS - AURORA, ILL. CHICAGO OFFICE - FIRST NATIONAL BANK BLDG.

THE AMERICAN WELL WORKS

PUMPS

The City of Henry Uses "Americans"

Back in 1921 the city of Henry, Illinois, installed a 4″ double suction "American" centrifugal pump. This motor driven pump was designed for 500 GPM, against 187 ft. head, and was direct connected to a 40 HP slip ring motor.

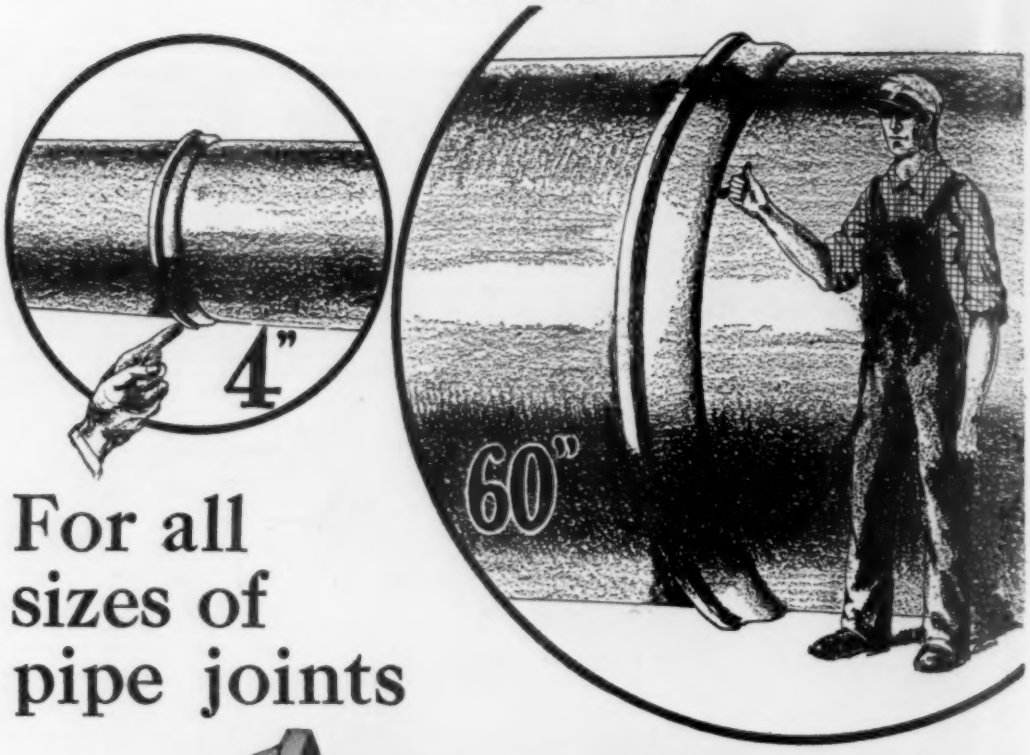
Recently, the city officials added an additional two stage "American" centrifugal pump, direct connected to both a 6 cylinder gas engine and a 40 HP motor. The pump being connected so that either gasoline engine or electric motor drive might be used.

This 4″ pump provides the city with an additional capacity of 500 gallons a minute against a total head of 70 lbs., and a vacuum of 26″.

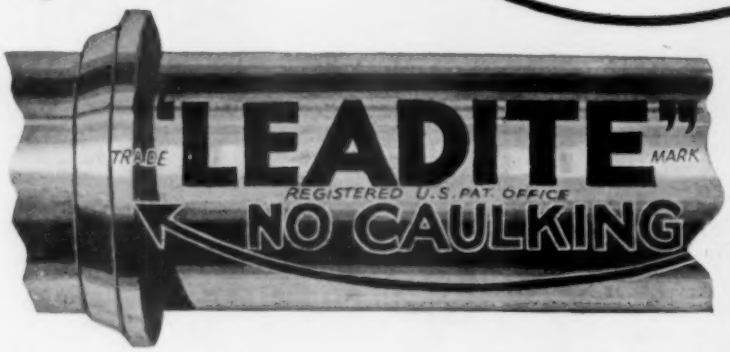
"American" engineers, with their long experience in municipal water supply and fire protection, are at the disposal always of municipal engineering departments. Ask them for particulars —they will be glad to advise!

GENERAL OFFICES *and* WORKS – AURORA, ILL. CHICAGO OFFICE – FIRST NATIONAL BANK BLDG.

THE AMERICAN WELL WORKS



For all sizes of pipe joints



LEADITE is used for making joints on all sizes of cast iron bell and spigot water mains from 4-in. to 60-in. in diameter.

There are thousands of miles of pipe jointed with LEADITE in service thruout the country.

LEADITE is used under all pressures and conditions encountered in water works construction.

The economies of LEADITE are numerous: LEADITE eliminates caulking, digging of large bell-holes, reduces cost of trench pumping, and allows the work to be done rapidly.

Hundreds of water works men, engineers, contractors, railroads, mines, and industrial plants all over the country are enthusiastic as to the merits of LEADITE for making joints in cast iron water mains without caulking.

LEADITE saves 50% to 75%.

LEADITE Users Are LEADITE Boosters—LEADITE Joints Improve With Age
LEADITE is the Pioneer Self-Caulking Substitute for Pig Lead
Be Sure It Is LEADITE and Accept No Imitations

THE LEADITE COMPANY, Inc.

100 So. Broad Street **Philadelphia, Pa., U. S. A.**

Let a Type "Y" Diesel pay for itself

Fairbanks-Morse
TYPE "Y"
Diesel Oil Engines
Sizes 37½ to 300 h.p.

The city of Oakley, Kansas, faced a deficit of $8,599.96 in 1921. Rising costs of coal and labor had made their steam, water and electric plant a losing proposition. They installed a 200-h.p. Type "Y". In 1922 the $8,599.96 deficit was turned into a $3,925.25 surplus. The city clerk wrote, "The earnings put back in the business astonished us."

A California city of four thousand inhabitants has used a 200-h.p. Type "Y" more than eight years. Their consulting engineer reports, "Between January 1 and July 31, this year, it ran 5060 out of 5088 hours. It was intentionally shut down for inspection four hours on the first Sunday of each month."

Consistent saving in fuel, labor and maintenance quickly repays the cost of a "Y" installation. Here are some of the features of this world-famous engine—features that thousands of users have proved give them more dependable power at far lower cost:

¶ Starts immediately from cold.

¶ Uses a very wide range of low-grade fuel.

¶ Gives close speed regulation for operating alternators in parallel.

¶ Meets the 24-hour service demand.

¶ 700,000 h. p. in successful operation.

Our engineers will give you estimates and guarantees based on your exact requirements, if desired. There is no obligation. Bulletin 1030 on request.

Fairbanks, Morse & Co.
Manufacturers Chicago

Twenty-Eight Branches Throughout the United States, Each With a Service Station.

FAIRBANKS-MORSE *Type "Y" Diesel Engine*

794

CAST IRON PIPE
AND FITTINGS

American Cast Iron Pipe Company
Birmingham, Ala.

SALES OFFICES IN PRINCIPAL CITIES

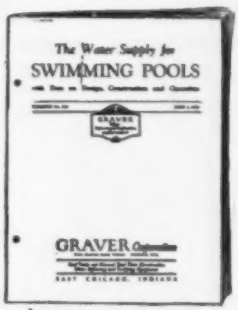
GLAMORGAN PIPE & FOUNDRY COMPANY
LYNCHBURG, VA.
General Founders and Machinists
Manufacturers of
Cast Iron Pipe
For Water and Gas, Flange Pipe and Fittings
Western Office: 543 The Rookery, Chicago

JAMES B. CLOW & SONS
General Offices:
534-546 S. Franklin Street, Chicago
Works:
Coshocton, O. Chicago, Ill. Newcomerstown, O.
Sales offices in all principal cities
Manufacturers of Cast Iron Pipe and Fittings

LYNCHBURG FOUNDRY COMPANY
Manufacturers of
CAST IRON PIPE AND FITTINGS
Main Office: LYNCHBURG, VA.
Works at Radford, Va., Lynchburg, Va.

DONALDSON IRON CO.
EMAUS, LEHIGH CO., PA.
MANUFACTURERS OF
CAST IRON PIPE
FOR WATER AND GAS
ALSO SPECIAL CASTINGS AND FLANGE WORK

National Cast Iron Pipe Co.
Birmingham, Ala.
MANUFACTURERS OF
Cast Iron Water and Gas Pipe
Sales Offices:
Peoples Gas Building, Chicago, Ill.
Land Bank Building, Kansas City, Mo.
Kirby Building, Dallas, Texas
Matson Building, San Francisco, Cal.



Swimming Pools
Graver Bulletin No. 500 contains complete information on recirculating, refiltering, heating, and sterilizing swimming-pool water, with detail drawings of the equipment that maintains a constant flow of clear, sparkling, hygienically pure water through the pool at all times.
Graver Corporation
690 Todd Avenue,
East Chicago, Indiana
Send for Bulletin No. 500.

THE VENTURI METER
"VENTURI"—Registered
For Water, Sewage, Gas, Air, Steam—in fact everything that flows.
Bulletins on Request.
Builders Iron Foundry, Providence, R. I.
New York, Chicago, Philadelphia, Pittsburgh, Dallas, Atlanta, Kansas City, San Francisco, Los Angeles, Portland, Ore., Toronto, Ottawa.

THE AMERICAN CITY

FRICTION FACTORS IN AN OLD 24-IN. CAST-IRON PIPE

Velocity	Loss Between Observation Points, Lb.*	Loss in Feet, per 1,000 Ft.	Coefficient — Hazen-Williams Formula	Coefficient — "n" in Kutter's Formula	Loss per 1000 Ft. New Pipe by Weston
4.86	20	3.00	131.4	0.0109	3.80
4.75	17	2.53	140.8	0.0103	3.64
4.24	16	2.38	130.0	0.0112	2.89
4.30	15	2.23	136.5	0.0106	2.97
Average.....			134.7	0.0107	

* No difference in elevation of gauges.

The line tested was a 24-in. main running from the pumping station at the shore of Lake Michigan to the town of Hammond about five miles inland. A few connections tap into this main near the pumping station and then for a distance of 16,000 ft. there are no

Sustaining Carrying Capacity

The tabulation in the clipping reproduced above shows that after twenty-five years of service, this main had a carrying capacity equal to that of new pipe.

Tables of carrying capacities in common use indicate a loss of capacity due to age. These tables are designed to include the cases where tuberculation takes place. This trouble is the exception, not the rule, and unless there is reason to believe tuberculation will occur, Cast Iron Pipe can safely be counted upon to deliver its full capacity for life. Where tuberculation does take place, Cast Iron Pipe can be readily cleaned without injury to the pipe.

THE CAST IRON PIPE PUBLICITY BUREAU, Peoples Gas Building, Chicago

CAST IRON PIPE

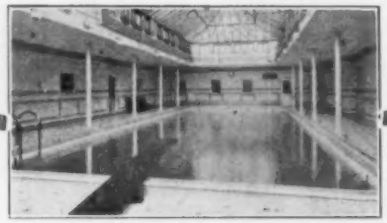
Our new booklet, "Planning a Waterworks System," which covers the problem of water for the small town, will be sent on request.

THE BELL & SPIGOT JOINT

THE ACCEPTED STANDARD FOR UNDERGROUND CONSTRUCTION

Send for booklet, "Cast Iron Pipe for Industrial Service," showing interesting installations to meet special problems.

FILTERS
for
NATATORIUMS



SCIENCE TO THE RESCUE!

Formerly free public baths were opposed by many as sources of possible contagion. Scientists have changed all this. Not only is the water kept wholesome, clear and invigorating from one to three years without emptying the pool by the NORWOOD THREE UNIT SYSTEM, but the previous prohibitive cost of trying to do this has been reduced to a nominal one.

NORWOOD ENGINEERING CO.
FLORENCE MASSACHUSETTS

Heenan Refuse Destructors
for
GARBAGE DISPOSAL

No Odors By-Products
No Dust Offset
No Coal Operating Cost

Will install and guarantee results.

JONES & VERY, Inc.
60 Wall St., New York City

HEENAN & FROUDE
Worcester, England

Pure Water

We manufacture filters for all domestic, industrial, and municipal requirements.

For over twenty-five years Roberts Filters have been supplying pure, clean water.

Write for descriptive literature.

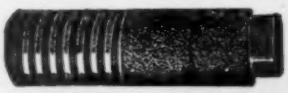
Roberts Filter Mfg. Co.
DARBY, PA.

INTERNATIONAL
GRAVITY FILTRATION PLANTS

THROUGH the years, the International Filter Co. has been the first to adopt improvements—the first to discard features that have proved hindrances of progress. The result has been that International equipment has maintained its leadership; that it is first now as always.

INTERNATIONAL FILTER CO.
Water Softening and Filtration Plants
Works and General Office: 333 West 25th Place, Chicago

New York Pittsburgh San Francisco
Canadian International Filter Co., Ltd., Toronto.



Save 25% to 50% by using

WYCKOFF WOOD PIPE
instead of Cast Iron Pipe

Cheaper. Lasts as long. Delivers more water. Get catalogue.

A. WYCKOFF & SON CO.
ELMIRA, N. Y.
Branches: ATLANTA, GA., H. H. White, 1503 4th Nat. Bank Bldg.
"The Originators of Machine Made Wood Pipe."
Established 1855

The offices of THE AMERICAN CITY, 443 Fourth Ave., N. Y., are headquarters for information on equipment for municipal work. If you want catalogs, prices or names of manufacturers, let us help you.

Guardian of the Public Health

Officials entrusted with the responsibility of providing pure and germless water should lock the stable door before the horse is stolen. Epidemics once started are stopped only after a heavy drain on lives, health and city finances.

E B G Liquid Chlorine has an enviable and continuously successful record in water purification. At a very low cost E B G Liquid Chlorine will destroy the sickness germs that are potential breeders of epidemics, and wreckers of official reputations.

The RED cylinder is a famous guardian of health. In it is supplied E B G Liquid Chlorine chemically pure.

Protect your water with E B G

Liquid Chlorine

Electro Bleaching Gas Co.

PIONEER MANUFACTURERS of LIQUID CHLORINE

Plant NIAGARA FALLS, N.Y.

***Main Office*: 9 East 41st Street, New York**

Send for the new booklet, "Liquid Chlorine for Water Sterilization and Sewage Disinfection," containing information so complete and authoritative it is regarded as a book of reference. Free on request.

Chemicals for Water Purification

We manufacture the highest grades of

Sulphate of Alumina

Chloride of Lime

and

Liquid Chlorine

PENNSYLVANIA SALT MFG. CO.

WIDENER BLDG. :: :: PHILADELPHIA, PA.

THE AMERICAN CITY

San Diego Makes Progress

THE city of San Diego, California, has enjoyed an unusual growth during the past ten years, having practically doubled its population. Because of this, unusual difficulties occurred with the public water supply in some of the outlying districts. To overcome these unsatisfactory conditions in one district and also to improve the efficiency at the central pumping plant, the city found it advisable to install an auxiliary storage in that section in the shape of an elevated steel tank of unusual size. The Pittsburgh-Des Moines Steel Company was awarded the entire contract of designing and building the tank foundations. This tank, with a capacity of 1,200,000 gallons and 127′ 5½″ in height to the top, is one of the largest elevated tanks in the country.

Perhaps you need additional water storage in your town, or an entire waterworks system. Get in touch with the nearest Pittsburgh-Des Moines office. For over thirty years we have been engaged in constructing municipal water systems in communities throughout the United States. Whatever your problems you will find our engineers can help you out.

We design and construct elevated steel tanks, standpipes, and complete waterworks systems, including pumping stations, filter plants and pipe lines. Call on us to install or improve your water system.

Send for our new Municipal Catalog No. 34.

Pittsburgh-Des Moines Steel Company

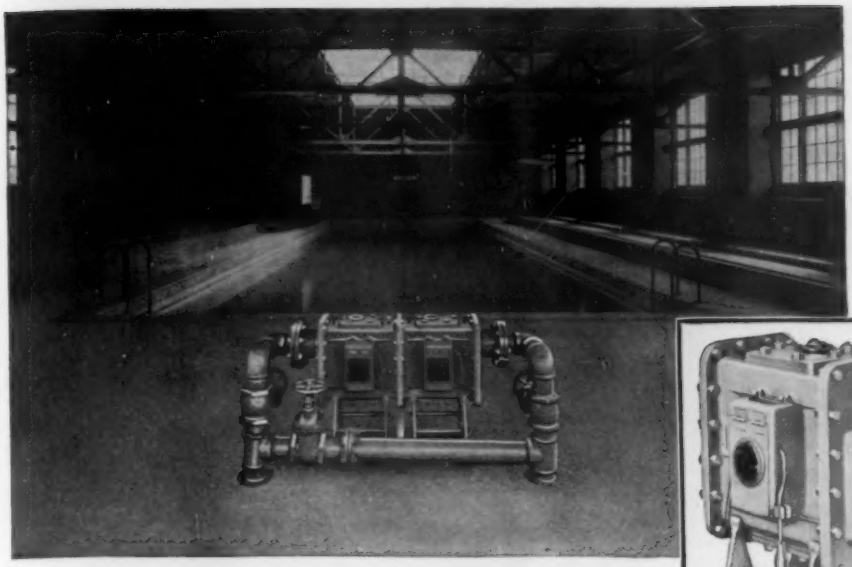
834 Curry Building
Pittsburgh, Pa.

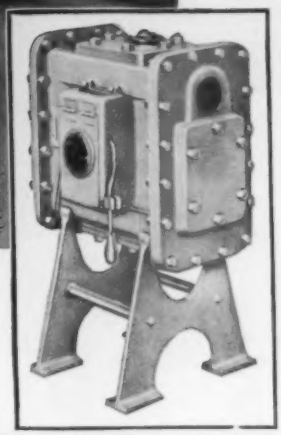
934 Tuttle Street
Des Moines, Iowa

New York Richmond Detroit Chicago Dallas San Francisco

PITTSBURGH DES MOINES

AMERICAN





R-U-V, ultra violet ray, Sterilizers guard the lives and health of the users of the pool of the Edward Lee McLain High School, Springfield, Ohio. How the excellent sterilization results obtained here were accomplished is told in our Booklet B-12.

Automatically Rendering Water Sterile

The human element that plays so large a part in the control of most other types of sterilizing apparatus is entirely eliminated by the R-U-V, ultra violet ray, process.

A simple turn of a switch—similar to the switching on of an electric light—and human responsibility for sterilizing regulation ends. From then on, the R-U-V, ultra violet ray, Sterilizer handles its job of rendering germless each drop of water that passes through it, independently of human control.

Since the R-U-V, ultra violet ray, Sterilizer does not rely upon dosing the water with germicidal chemicals, there is no dosage to regulate to suit the ever changing bacterial content of the water. And, there is no haphazard guessing as to the amount of dosage necessary.

This positive and automatic action of the R-U-V, ultra violet ray, Sterilizer makes it especially desirable for drinking water sterilization.

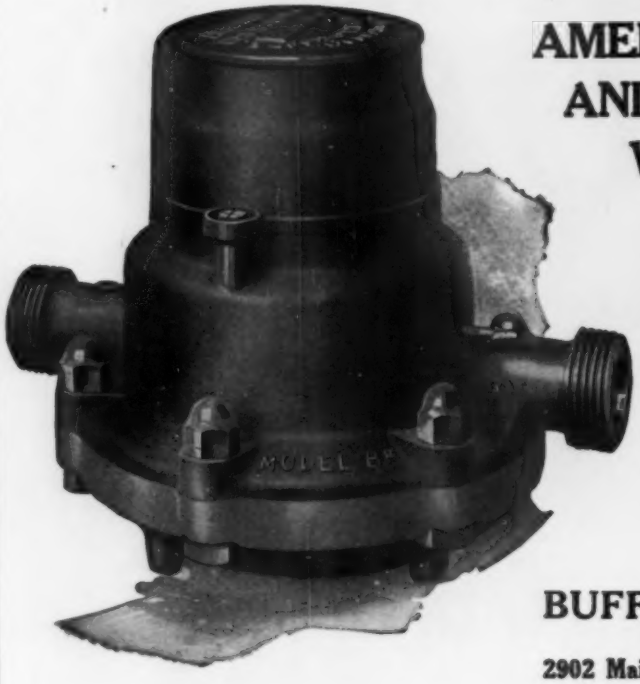
It is unnecessary to maintain a staff of experts to control the sterilization process and there is a positive assurance that no pathogenic bacteria will pass on to the water consumer.

This simplicity of operation and the positive sterilization assured are shown in a recent publication of our engineering departments. A copy may be had upon request. Simply ask for Booklet B-12.

The R. U. V. Company, Inc.
383 Madison Ave.
New York, N. Y.

R-U-V
Ultra Violet Ray Water Sterilization

James B. Clow & Sons
534-546 So. Franklin St.
Chicago, Ill.



AMERICAN AND NIAGARA WATER METERS

are made in ten pipe sizes, from ⅝ in. to 4 in. inclusive—in four styles of outside casings, the breakable frost bottom type is illustrated herewith—with either round reading or straight reading registers—with submerged working parts of one best model, built of hard rubber and bronze composition.

WRITE FOR CATALOG

BUFFALO METER CO.

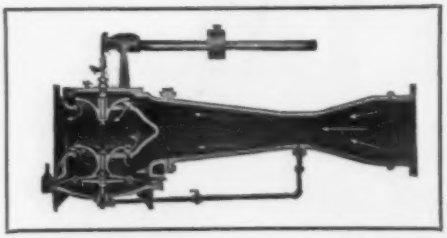
ESTABLISHED 1893

2902 Main Street, Buffalo, N. Y.

For higher bacterial efficiency on your filter operation—

SIMPLEX

Rate-of-Flow Controllers



Direct Acting, Keeps Its Adjustment, Eliminates Surging and Breaking the Filter Bed, Consequent High Bacterial Efficiency.
For use where Water or other liquids are filtered either by pressure or gravity—especially where the rate of filtration must be kept constant.
Used successfully by ALL the leading Filter Companies and specified by the most prominent Consulting Engineers.
The Simplex is the Only Commonly Used and Successful Direct-Acting Controller on the Market.
One set of moving parts, all-connected and acting together, insures simplicity and freedom from adjustment.

Our Engineering Department is ready at all times to discuss your particular problem with you—
"Simplex Installations Give Satisfaction"

Simplex Valve & Meter Co., 57th and Race, Phila., Pa.

Manufacturers of Meters and Rate Controllers of the Venturi type, Gauges and other Water Works Devices.

WATER METERS

A full line, as illustrated, in all standard sizes.

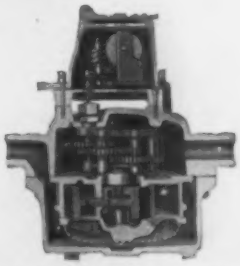
We also make the PREMIER, a Venturi style meter, with positive displacement recorder, for measuring full flow through main or conduit.

We have been designing, studying, making and selling meters since 1870. Our organization and our experience are always at your service.

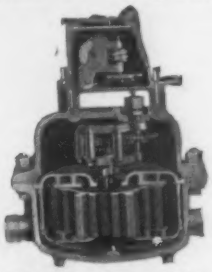
NATIONAL METER COMPANY

299 Broadway, New York

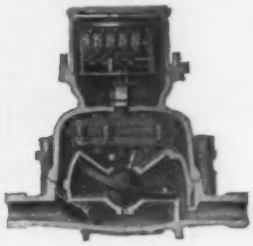
Chicago Boston Cincinnati
Atlanta San Francisco Los Angeles



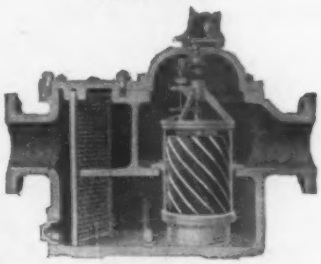
EMPIRE Oscillating Piston



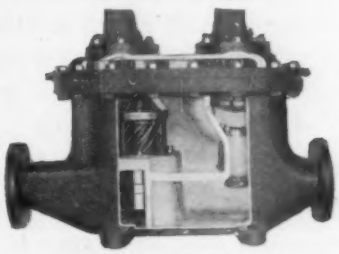
CROWN Rotary Piston



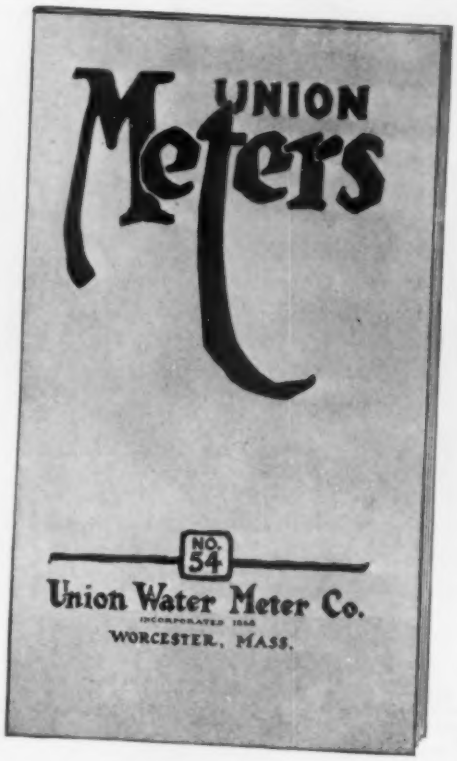
NASH Disc



GEM Velocity



EMPIRE-COMPOUND



Valuable Information for You

This book, just off the press, contains data concerning water meters and allied products that will help you. It has been compiled with the thought of giving under one cover complete information concerning our products which are the results of more than half a century of continuous manufacturing.

Union Water Meter Company
Incorporated 1868
Worcester **Massachusetts**

"WATCH DOG"

WATER METERS

Accurate
Durable
Efficient

GAMON METER COMPANY
Main Office and Works:
NEWARK, NEW JERSEY

GURLEY LEVELS

Accuracy, durability, ease and permanence of adjustment are qualities which have caused Gurley Levels to be recognized as the Standard Engineers' Wye Level.

Send for descriptive bulletin.

W. & L. E. GURLEY
Instrument Makers Since 1845
Troy, N. Y. **U. S. A.**

WRITE US FOR CATALOG

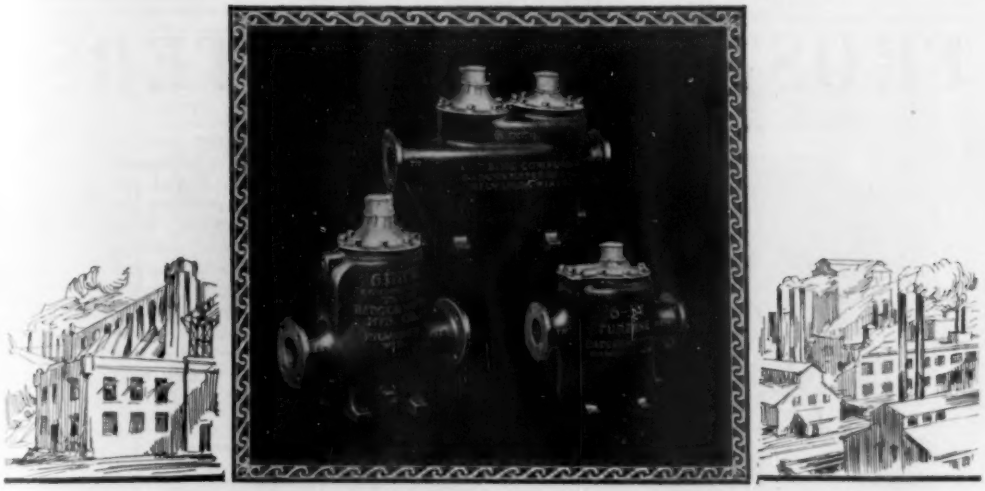
"MICHIGAN" WATER PIPE

ECONOMICAL — DURABLE

IDEAL FOR: Water Works Supply
Power and Manufacturing Plants
Railroad Water Supply.

MICHIGAN PIPE CO., Bay City, Mich.

THE AMERICAN CITY



Ticking off the heavy flow —*Accurately!*

The heavy duty industrial meters draw the toughest assignments in water meter service. Under all conditions, they must be dependable. They cannot flinch under the largest flow nor slight the smallest. They must *register accurately.*

To cope with this task it takes real, staunch, sturdily made meters. And your assurance of this exacting service is found in *Badger Compound Meters.* Where a Turbine Meter is used, a Badger Compounding valve can be installed and will effect the accurate registration of all streams and make possible increased revenue. Long have they been reputed for their accuracy. Chiefly because they are *built right.*

Badger Water Meters are designed by practical water works engineers with years of experience. All parts are readily accessible and are made of such metals and materials that will not corrode, nor wear unduly and tend to prolong the life of the meter.

Let Badger Compound Meters prove their dependability, accuracy and earning powers. Remember they are faithful to the last drop.

Write for special bulletins.

BADGER METER MFG. CO.

841-30th St., Milwaukee, Wis.

BRANCHES:

111 W. Washington St., Chicago, Ill.
414 Interstate Bldg., Kansas City, Mo.
32 Court Street, Brooklyn, N. Y.
1621-39 - 15th St., Denver, Colo.

BADGER METERS

"Faithful to the last drop"

FROST PROOF METERS

LAMBERT FROST-PROOF METERS are the most efficient, simplest and easiest water meters to take apart and put together again. Long life and accuracy are inherent qualities with these meters. When frozen the patented non-corrosive yielding bolt device permits the top and bottom casings, disc chamber and gear train to part, thereby preventing any damage to the casing or internal mechanism. This frost-proof device can be used over and over again after the meter has been frozen without the need of any new parts.

Complete descriptive literature sent at your request.

THOMSON METER CO.

100-110 Bridge St., Brooklyn, N.Y.

WATER METERS

The TROPIC—An all-bronze Water Meter, with connection spuds attached to the lower case. Particularly designed for warm sections of the country.

Tropic

Arctic

The ARCTIC—A frost-bottom Water Meter, especially designed for cold sections of the country.

These two meters, embody exactly the same mechanical features, the only difference being the changes necessary to provide a frost-breaking feature in the Arctic.

Either of these meters will be equipped with a COMPLETELY ENCLOSED intermediate train RUNNING IN OIL, if desired.

Write or Wire nearest office for full information.

"Please note change of address"

PITTSBURGH METER CO.

7800 Susquehanna St., Pittsburgh, Pa.

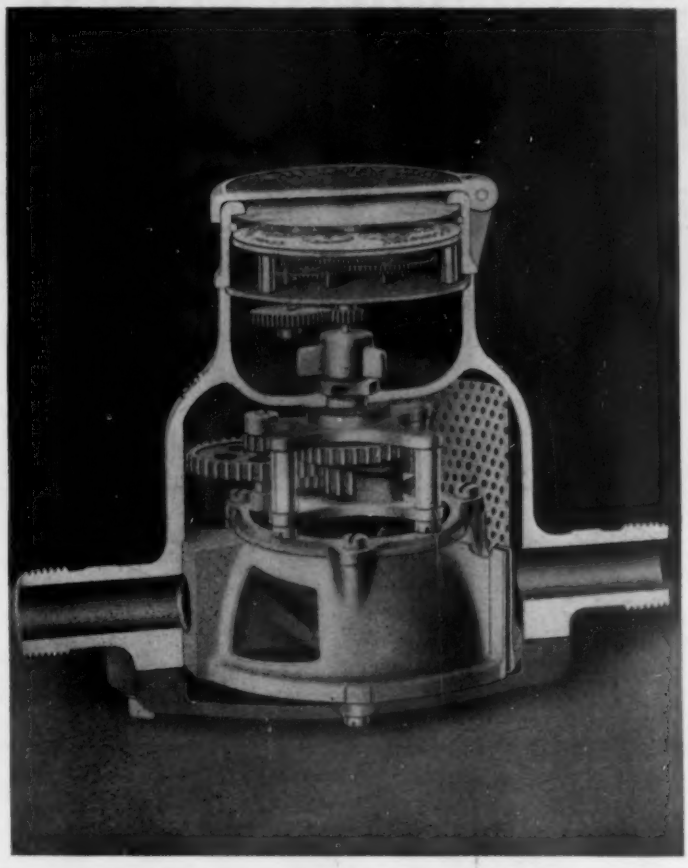
New York, Columbia, S. C., Chicago, Seattle, Kansas City, Los Angeles

Cast Iron Pipe and Fittings

"Mathews" (REG. U. S. PAT. OFF.) Fire Hydrants

Gate Valves
Check and Foot Valves

R.D. WOOD & CO.
ESTABLISHED 1803
PHILADELPHIA, PA.



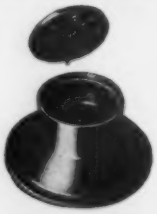
THOUSANDS of Hersey Water Meters have survived 25 and 30 years of rough and tumble service with practically no loss of registration accuracy. They are automatic revenue computors of the highest quality.

Hersey Manufacturing Company, South Boston, Mass.

7342

The Complete Line of FORD WATER METER SETTINGS & ACCESSORIES

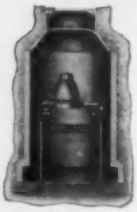
We have Meter Box Covers of Every Type.



DOUBLE LID COVERS

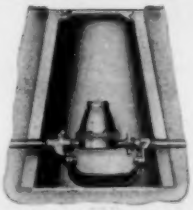
SINGLE LID COVERS

METER TESTERS



DOUBLE LID COVER WITH YOKE

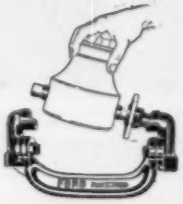
SOUTHERN TYPE CRESENT BOX



SOUTHERN TYPE S WITH YOKE

FORD METER GRIP

RAMS HORN



FORD YOKE

Everything for the Water Meter System but the Meter

FORD METER BOX CO.

WABASH, INDIANA, U.S.A.

Saving 7,000,000 Gallons of Water Daily

OMAHA, Nebraska, has water meters. That means that the water supply and pumping system of the city is functioning on an efficient basis. It means that every inhabitant has abundant water for every necessary use, without anyone bearing the burdensome cost of water waste. It means that everyone is reaping the benefits, in actual saving, of an economical water supply. The figures bear out these facts.

Previous to metering, the daily, per capita, consumption of water was 130 gallons. Since metering it has been 95 gallons. This difference of 35 gallons daily, per capita, represents a saving of over 25 per cent in water use and an even greater reduction in station pumpage. A saving of 7,000,000 gallons of water daily in a city of 200,000 is an item large enough to attract the attention of every engineer who is struggling with the problem of excessive water demand.

Meters did not restrict the legitimate use of water in Omaha. They *did* eliminate water waste, reduce pumpage costs, reduce sewage disposal cost—they saved money for every water user. Among other advantages, they distributed the cost of water equitably—on the basis of the actual quantity used.

Metering will reduce water waste in your city. Study the results where meters have been installed.

AQUAFAX is a 56-page, monthly magazine giving current news and accurate information regarding the conservation of water. The regular subscription price is $3.00 per year, but it will be sent free upon request to engineers, municipal heads and civic organizations.

A WATER meter must be an accurate measuring instrument. Yet it must be made to render constant service, under adverse conditions, over a long number of years.

Neptune has met these requirements in its Trident Meter, by simplifying its mechanism, protecting its wearing parts and insuring, by improved methods of manufacturing and inspection, that every part is perfect. There are over 2,600,000 Tridents in use today.

Send for a copy of the new 86-page book illustrating and describing all types and sizes of Neptune Trident Meters.

NEPTUNE METER COMPANY

Pioneers in Meter Progress

50 EAST FORTY-SECOND STREET, NEW YORK CITY

Neptune Meter Co., Ltd., 1197 King Street, West, Toronto, Ont.

Boston Chicago San Francisco Atlanta Los Angeles Seattle Portland St. Louis, Mo.

Write for
"SEWER CLEANING EQUIPMENT."

The Turbine Sewer-Machine Company
195 Eleventh Street **Milwaukee, Wis.**

COLUMBIAN IRON WORKS
CHATTANOOGA, TENN.
Manufacturers of Fire Hydrants, Valves, Valve Boxes, Sluice Gates, Meter Boxes and Water Works Supplies
ESTIMATES PROMPTLY FURNISHED

SLUICE GATES, CHECK VALVES, AIR VALVES, INDICATOR POSTS, ETC.
GATE VALVES **EDDY** **FIRE HYDRANTS**
Hydraulically and Electrically Operated Valves and Sluice Gates. Valves Designed For All Kinds of Service.
EDDY VALVE COMPANY, WATERFORD, N. Y.
New York Chicago Boston San Francisco Philadelphia

Pat. No. 965163

D. & D. Safety and Noiseless Cover

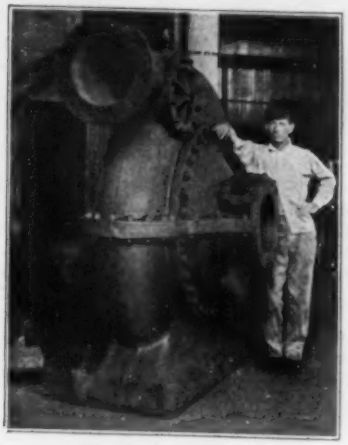
WM. E. DEE COMPANY
80 N. La Salle Street Chicago, Ill.
We manufacture Manhole, Catch Basin and Sewerage Castings of all kinds. We make anything in Gray Iron. Write for our prices.

MUNICIPAL GARBAGE & RUBBISH INCINERATORS
THE BALMER INCINERATOR
SOLVES THE GARBAGE & RUBBISH DISPOSAL PROBLEM FOR CITIES... NO AUXILIARY FUEL REQUIRED
THE BALMER CORPORATION
150 NASSAU ST.... NEW YORK CITY

DEAN
ELECTRIC CONTROL UNIT
FOR THE MOTOR OPERATION OF LARGE GATE AND GLOBE VALVES
WRITE FOR BULLETINS
PAYNE DEAN LIMITED
STAMFORD, CONN.
CHICAGO NEW YORK PITTSBURGH

KENNEDY
WATER GATES
HYDRANTS
VALVES
THERE ARE 500 TYPES AND SIZES OF KENNEDY VALVES AND THEY ARE FULLY DESCRIBED IN OUR LATEST CATALOG. SEND FOR IT TODAY.
The Kennedy Valve Mfg. Co
BRANCHES: 95 John St., New York; 228 N. Jefferson St., Chicago; 47 India St., Boston; 23-25 Minna St., San Francisco.
SALES OFFICES: Salt Lake City, Seattle, El Paso.
EXPORT OFFICE: Elmira, N. Y.
210

FOR PUMPING UNSCREENED SEWAGE



Catalog 28-A

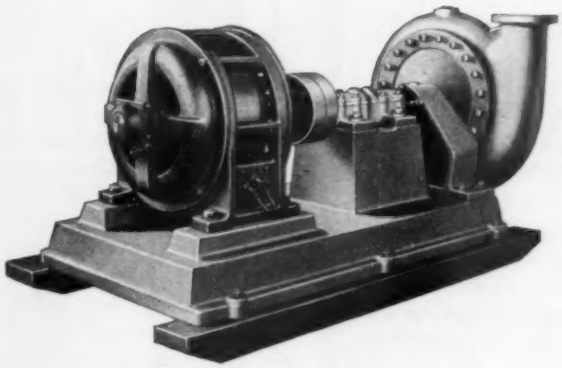
(Larger edition to follow)

USE THE

(A. B.)

WOOD TRASH & SEWAGE PUMP

(New Orleans) (Patented)



FULLY GUARANTEED

CHEAPEST TO OWN IN THE LONG RUN

Address

PACIFIC FLUSH-TANK CO.

4241 Ravenswood Ave.
Chicago, Ill.

Singer Building
New York

We do not design Pumping Stations—only the Equipment

Fire Hydrants

Smith Fire Hydrants are scientifically constructed by engineers to deliver the greatest volume of water under a given pressure.

Smith Fire Hydrants are designed with easy-flow waterways without detours or obstructions which have a tendency to kill efficiency and retard the flow. This hydrant is built strictly along hydraulic principles to meet the exacting demands of modern fire equipment.

Compare this hydrant with other hydrants under parallel and static conditions, and you will find that the Smith hydrant produces the greatest volume at the nozzle, with low frictional loss.

Easy-operation with positive drip-valve. Built for rugged use. Adopted by cities throughout the country and especially designed for high pressure services.

Made by the makers of Smith Tapping Machines, Valves, Gate Valves and other water works specialties.

The A. P. Smith Mfg. Co.
East Orange, N. J.

KELLY CONCRETE WELLS

The City of Holland, Michigan, gets all of its water supply from enduring Kelly Concrete Wells. The above photograph shows well No. 1, being pumped at a rate of 2,000 G.P.M. The well is 73 feet deep.
Water normally stands 15 inches below grade. When pumping continuously at the above rate the water lowers 32 feet, leaving 39 feet 9 inches of water in the well.
We estimate the maximum development from this one well to be 4,500,000 to 5,000,000 gallons per 24-hour day.

KELLY WELL COMPANY

Main Office: Grand Island, Nebr.
Branch Office: Kalamazoo, Mich.

Fig. No. 50

MUNICIPAL WATER SUPPLY

The cut to the left is the Cook Patent Brass Tube Well Strainer which is shown over Fig. No. 50 with standard fittings which are foot of blank and lead packer on top and bail plug in bottom. Where the maximum supply of a well ending in water bearing sand or gravel is required under trying conditions, submit them to us and receive our recommendations and prices.

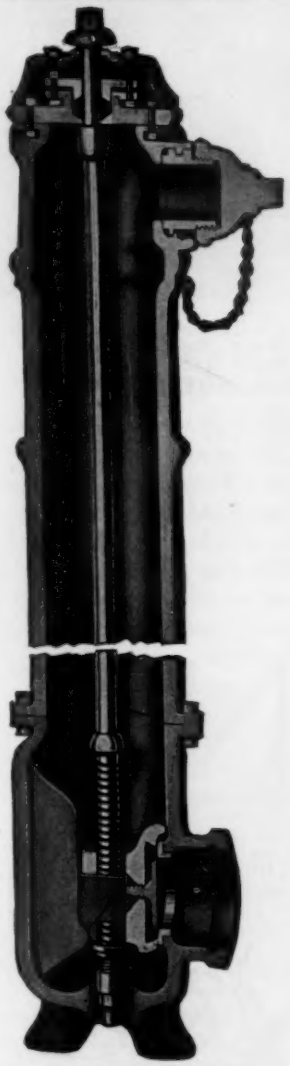
A. D. COOK, INC.

LAWRENCEBURG, INDIANA

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

LUDLOW HYDRANTS

USED IN OVER 3000 CITIES THROUGHOUT THE UNITED STATES



The Ludlow Slide Gate Fire Hydrant is built to meet the demand for a strictly first-class, non-freezing hydrant, strong in every part, simple in construction and one that gives a practically unobstructed flow of water. It performs its work easily and satisfactorily under all conditions of soil and weather, produces no water hammer in closing, remains tight under all pressures and has a positive drip which drains the hydrant barrel completely. All of the working parts can be taken out without any digging and without disturbing the hydrant barrel.

The latest Ludlow catalog describes these hydrants in detail, giving instructions for installing them. It also lists single and double gate valves in all sizes.

The Ludlow Valve Mfg. Co.

TROY, N. Y.

Branch Offices: New York - Chicago - Boston
Philadelphia - Pittsburgh - Kansas City

THE AMERICAN CITY

A PUBLIC COMFORT ROOM IN SPOKANE. STANDARD PLUMBING AND HEATING COMPANY INSTALLED CRANE PLUMBING MATERIALS THROUGHOUT THIS COMFORT STATION

HOW WILL YOUR COMFORT STATIONS SERVE IN TEN YEARS?

Comfort stations help to safeguard the health of a locality only so long as they are kept sanitary and in repair. As soon as a fixture goes out of service or a soil pipe clogs or a water line develops a leak, these public retreats are apt to become veritable harboring places for filth and germs. You can easily make important provisions against this situation at the time of building comfort stations. By installing rugged Crane fixtures and piping materials which are especially designed for public places, you provide equipment which will last and serve through many years of hard public usage.

CRANE

GENERAL OFFICES: CRANE BUILDING, 836 S. MICHIGAN AVENUE, CHICAGO
CRANE LIMITED: CRANE BUILDING, 386 BEAVER HALL SQUARE, MONTREAL
Branches and Sales Offices in One Hundred and Forty eight Cities
National Exhibit Rooms: Chicago, New York, Atlantic City, San Francisco and Montreal
Works: Chicago, Bridgeport, Birmingham, Chattanooga, Trenton and Montreal
CRANE EXPORT CORPORATION: NEW YORK, SAN FRANCISCO, SHANGHAI
CRANE-BENNETT, LTD., LONDON
CIE CRANE: PARIS, NANTES, BRUSSELS

Crane Drainage Fitting

Winter Has Come

Low Pressure
Caused by Encrusted Mains
Invites Conflagration

NATIONAL WATER MAIN CLEANING CO.

HUDSON TERMINAL
BUILDING

NEW YORK CITY
U. S. A.

WHEN YOU BUY
PIPE
REMEMBER

CAST IRON PIPE
NATIONAL
IS MADE RIGHT

MADE BY SAND CAST AND DE LAVAUD CENTRIFUGALLY CAST PROCESSES

NATIONAL CAST IRON PIPE Co.
BIRMINGHAM, ALABAMA

SALES OFFICES:
Chicago—1231 Peoples Gas Bldg.
Kansas City, Mo.—603-04 Land Bank Bldg.
Dallas—916 Kirby Building.
San Francisco—1026 Matsen Bldg.

Be Sure Your Drinking Water is Right

Why take a chance on the health of your community?

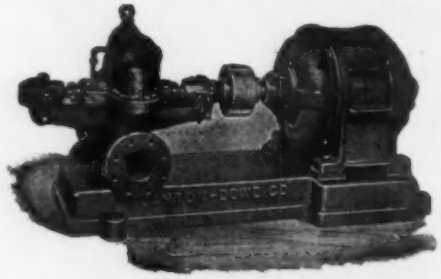
The P. T. L. Systematic Examination is your best insurance against contamination in your Water Supply.

Bulletin 25 tells how we can serve you.

Pittsburgh Testing Laboratory
Inspection Engineers and Chemists
Pittsburgh, Pa.

Branch Offices in the Principal Cities.

DAYTON-DOWD
CENTRIFUGAL
PUMPS



You can depend on Dayton-Dowd Centrifugal Pumps

Catalog on Request.

DAYTON-DOWD CO.
346 YORK STREET, QUINCY, ILL.
Offices in principal cities.

Cast Iron Pipe
for Water and Gas

Cast Iron Pipe and Special Castings, Bell and Spigot, Flange, Flexible Joint, Culvert, Milled and Plain End Tubes, Cylinders, Flanged and Bell and Spigot Fittings, High Pressure Fire Service Pipe, Warren Short Body Specials.

Sizes 2- to 60-inch

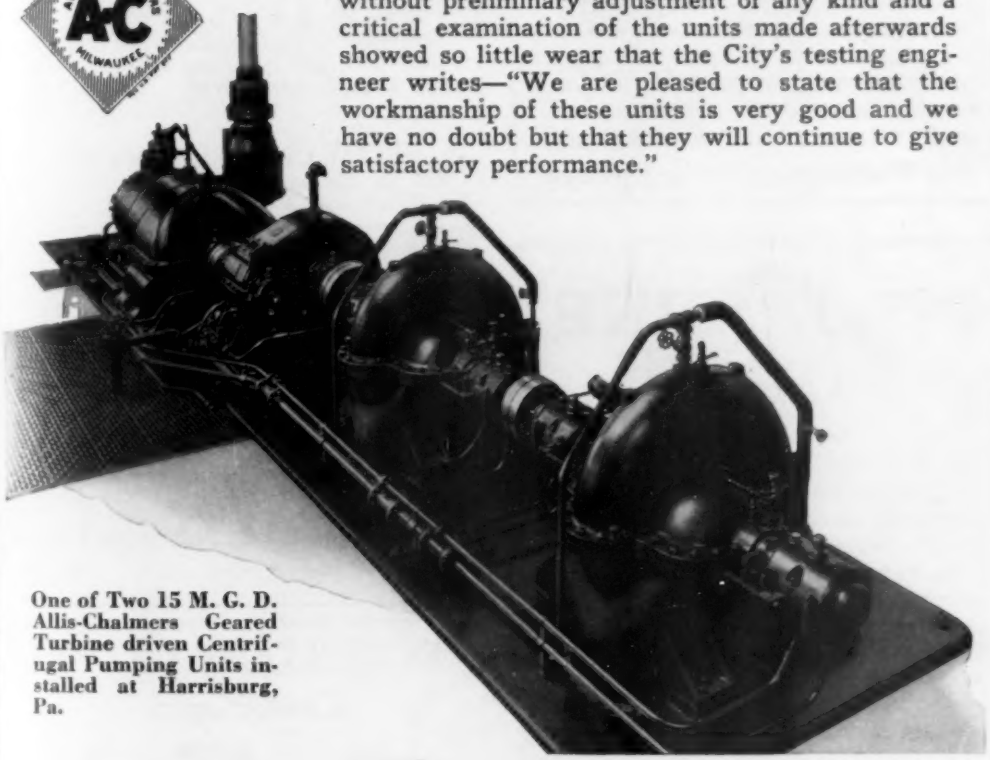
Pipe manufactured in accordance with standard specifications adopted and approved by water works associations and engineers.

Warren Foundry & Pipe Co.
Formerly
Warren Foundry and Machine Co.
Sales Offices: Bowling Green Building, New York City
201 Devonshire Street, Boston, Mass.

A TEST OF INTEREST TO WATER WORKS SUPERINTENDENTS AND ALL ENGINEERS HAVING PUMPING PROBLEMS

Showing the Efficiency and Durability of Allis-Chalmers Combined Centrifugal Pumping Units

During August, 1924, the City of Harrisburg ran a test after one year's continuous operation on their two Allis-Chalmers 15 million gallon per day geared Steam Turbine driven Centrifugal Pumping units and obtained slightly better average duty than on the original acceptance test which was six per cent better than guaranteed. The second test was run without preliminary adjustment of any kind and a critical examination of the units made afterwards showed so little wear that the City's testing engineer writes—"We are pleased to state that the workmanship of these units is very good and we have no doubt but that they will continue to give satisfactory performance."



One of Two 15 M. G. D. Allis-Chalmers Geared Turbine driven Centrifugal Pumping Units installed at Harrisburg, Pa.

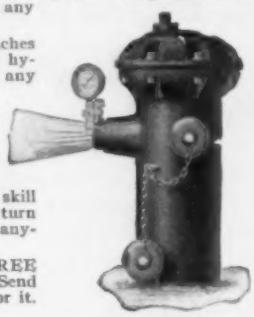
ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Velocity Gauge

Only a Velocity Gauge will show you the Flowing Pressure and the Gallons per Minute from any fire hydrant.

Tells the Condition, the Capacity, the Flow in Gallons of Water from any Fire Plug connected to any size main in any locality.



Without tools attaches itself to any make hydrant, any thread, any size opening.

Scientifically made and accurate. Fitted with our special needle valve; finely finished.

No experience or skill needed, just attach, turn on water and read it; anyone can.

You try it! Sent FREE for a 30 days' trial. Send no money, just ask for it. Hundreds in use.

Complete, in case, with Dial and express charges prepaid by us, ready to use, ONLY . . . $24.75

W. S. DARLEY & CO.

Makers Since 1908 of

INSTRUMENTS and APPARATUS

2810 Washington Blvd., Chicago

"CLEANS OLD WELLS and keep them clean"—

That's just one advantage of the Sullivan Air Lift Pumping Systems —for others, send for air lift catalog No. 371-H.

The cut shows the Air Lift Discharge at Fort Meyers, Florida. Intensive pumping (back blowing) freed this well from sand accumulations and greatly increased its capacity. A Sullivan Compressor furnishes air.

SULLIVAN MACHINERY CO.

125 So. Michigan Ave. Chicago

OIL ENGINE POWER

A SPLENDIDLY edited, illustrated and printed monthly magazine which interestingly describes and illustrates how the Oil Engine can save money, do more work and better work for Municipalities than any other type of Prime Mover.

You need this magazine every month to keep abreast of the developments in this field.

USE THE COUPON

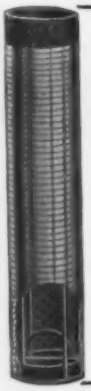
OIL ENGINE POWER

27 Pearl St., New York City

Send me the next twelve issues of your magazine and mail me an invoice for $2.00.

Name .....

Address .....



JOHNSON BRASS WELL SCREENS

Have 50% greater capacity than any other. If your well ends in sand or gravel you need one. Insures continuous use.

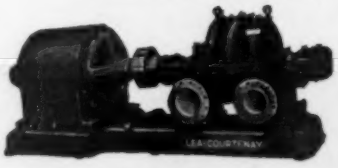
Write us

Edward E. Johnson, Inc.

St. Paul Minn.

LECOURTENAY PUMPS

Centrifugal

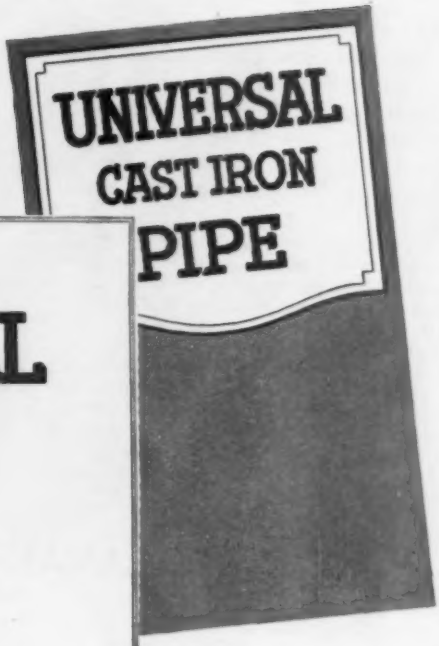


Pumping machinery for every kind of pumping service.

LECOURTENAY COMPANY

8 Maine Street, Newark, N. J.

You need these—



UNIVERSAL

CAST IRON

PIPE

for Fire Protection

APPROVED
BY THE
UNDERWRITERS
LABORATORIES
which are under the
direction of the
NATIONAL BOARD OF
FIRE UNDERWRITERS

THE CENTRAL FOUNDRY COMPANY
Subsidiary of
IRON PRODUCTS CORPORATION
41 East 42nd Street, New York, U. S. A.

Note: The following pages containing extracts from the Report of the Underwriters Laboratories are recommended to your careful reading.

The highest development in cast iron pipe. For Water Supply and Fire Protection.

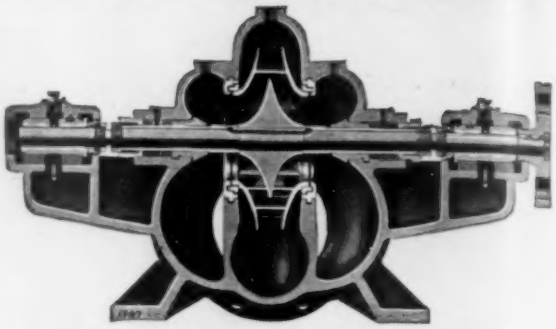
No lead, no pouring, no bell holes to dig.

Tight, Flexible, Dependable.

Write Nearest Office:

New York .....41 East 42nd Street
Chicago .....McCormick Bldg.
Birmingham .....Age-Herald Bldg.
Dallas..... Praetorian Bldg.
San Francisco.. .....Rialto Bldg.
Los Angeles..... 1221 Sante Fe Avenue

Every Pump a Masterpiece



THE efficiency, general running qualities, and other characteristics of a centrifugal pump depend in part upon good finish and correct adjustment, and by careful hand fitting and finishing, individual pumps of cheap construction can sometimes be made to show good results on test.

Perfect construction and performance in insured in *every* De Laval pump, however, by our system of manufacture to limit gages on an interchangeable basis. The running clearances, for example, should be accurate, not only to avoid rubbing and wear, but also to permit of reducing leakage and slip to the lowest practicable amount. The limit gage method of manufacture enables us to reduce these clearances to the minimum in each and every pump produced. During manufacture the parts are repeatedly inspected by an inspection department which is independent of the production department, and finally, when the machine is completed it is thoroughly tested by a third independent department, which certifies concerning both the satisfactory mechanical operation and as to the fulfillment of guarantees as to head, capacity, efficiency and power consumption. A De Laval machine is a standardized, perfected article, which must be right in every respect in order to get out of the shop.

Ask for Pump Catalog B-64.

DE LAVAL STEAM TURBINE CO.

TRENTON, NEW JERSEY

LOCAL OFFICES: Atlanta, Birmingham, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Duluth, Havana, Houston, Indianapolis, Kansas City, Los Angeles, Missoula, Montreal, New York, New Orleans, Philadelphia, Pittsburgh Salt Lake City, San Francisco, Seattle, Toronto

312

Security Sewer Rods

Security Rods are made from second-growth hickory, with malleable iron couplings swedged or shrunk down very tightly on the curved places at end of sticks. Security couplings *cannot* come off.

Joint and unjoint easily and quickly —light weight—long runs easily made. No slack but lend themselves to all practical bends.

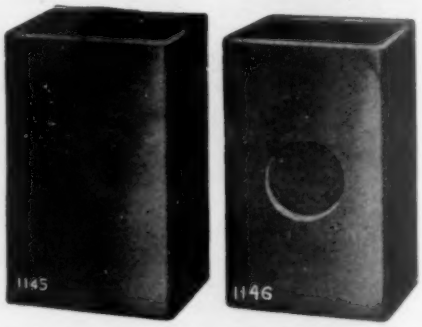
They cannot buckle or uncouple in the duct.

Send for Flyer No. 16

F. Bissell Company

812 Lafayette Street TOLEDO, OHIO

BRICK CHIMNEYS ARE NOT SAFE ENOUGH



Protection is needed from the tremendous fire losses caused by defective flues.

Dickey Flue Lining meets every requirement of all ordinances prescribing Flue Lining for safe construction.

Send for Literature and sample ordinances.

W. S. DICKEY CLAY MFG. CO.

Established 1885

235 New York Life Bldg.

KANSAS CITY MISSOURI

NEXT time you get a chance, look into the trench where the men are putting in a gas line or enlarging the town's sewer facilities. Examine the Vitrified Clay Pipe line that has been in there for years. You'll find it shiny and smooth, like the day it went in. No signs of the action of ground chemical or grounded electric current—no signs of decay. And it will stay that way.

Think of this when specifying materials on the next job. For permanence, lay the pipe that can't wear out, Vitrified Salt-Glazed Clay Sewer Pipe.

Clay Products Association
Chamber of Commerce Bldg.
Chicago

VITRIFIED Salt Glazed CLAY
Sanitary Sewer Pipe

AC-12F-RTG.

YEOMANS

ESTABLISHED 1898

SEWAGE EJECTORS,
SEWAGE PUMPS, BILGE PUMPS
and GENERAL SERVICE PUMPS

The Mark of Dependability

Our Engineers can solve your problems. Write for special catalogs.
Representatives in all principal cities.

YEOMANS BROS. CO.
1417 Dayton St., CHICAGO, ILL.

DEPENDABILITY

"POMONA" Double Stroke Deep Well Power Pump
Write for descriptive catalogs
UNITED IRON WORKS, Inc., Kansas City, Mo.

IRON PIPE RAILINGS

When in the market for Pipe Railing for Stairs, Bridges or Retaining Walls, send us your drawings. We can quote you prices that will be worth considering.
Dept. A
PIPE RAILING CONSTRUCTION CO., Long Island City, New York

PUMPS

A Type for Every Service

Bulletins on request

THE GOULDS MANUFACTURING CO
SENECA FALLS, N. Y.

GOULDS

TRADE MARK
DOWNIE
REGISTERED U. S. PATENT OFFICE

DEEP WELL PUMPS

Downie Deep Well Pumps are offered for Heavy, Continuous Service in Deep Artesian Wells. They are built in Double and Single Stroke Models and may be Steam Driven, Belted, Direct Geared to Motor, or equipped for any other standard form of drive.

Smaller Pumps for lighter service.

Catalog No. 6 on request.

Downie Centrifugals, single and multi-stage, Catalog 801.

Keystone Driller Company
170 Broadway, New York Monadnock Block, Chicago Joplin, Mo.
Beaver Falls, Pa.

Use Our Lead Pot!

Even the fittings for McWane 4- and 6-inch Cast Iron Pipe have PRECALKED JOINTS now.

—Another step toward the final retirement of lead pot and bell holes from pipe-laying.

—More speed in installation, less cost and labor per foot of main.

Over 4,000,000 feet of McWane pipe in service today. Most of this is through reorders from satisfied users.

WE also make the smallest cast iron pipe in America—1¼,- 2-, and 3-inch sizes. Ideal for services and other small lines for underground water and gas service.

Rust-proof, permanent, economical. Used by many of the largest and most progressive water and gas departments in the country.

Investigate

McWane Pipe Costs Less!

Write nearest office for booklet AC, Users' names, prices.

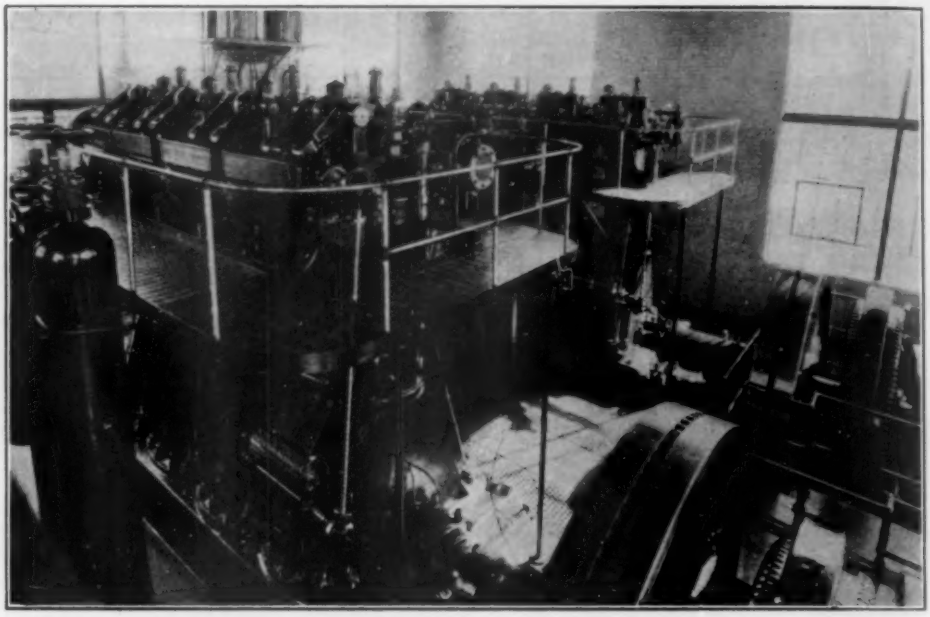
McWane Cast Iron Pipe Company

General Offices: Birmingham — **819-821 Bankers Trust Bldg.** Philadelphia — **422 Central Bldg.** Los Angeles — **1301 Magnolia Bldg.** Dallas

manufacturers of

Sizes 1¼ to 6 inches. McWANE PRECALKED JOINT PIPE CAST IRON Standard Lengths.

Diesel Oil Engines for Municipal Service



Hereunder are some extracts from a letter received from the Mayor of the City of Woodward, Oklahoma, where the two McIntosh & Seymour engines illustrated above are installed

COSTS WITH STEAM ENGINES

Our audit showed that for the 395 days referred to we used coal each day which cost us, delivered at the Plant, $119.05. We also used fuel oil to the amount of $8.56 per day. We used packing and waste to the amount of $1.58 per day, while our expense actually paid for repairs alone, including shop work, welding flues and grates for the boilers, and not including any new piece of machinery was over $40.00 per day. Nineteen men were employed at the Plant all of the time and Twenty-one men part of the time.

COSTS WITH DIESEL ENGINES

We have built a new plant and moved our pumping plant into a pump pit in the new building, installed a new switchboard, two 520 H.P. McIntosh & Seymour Diesel Engines with the necessary cooling water system and fuel oil tanks.

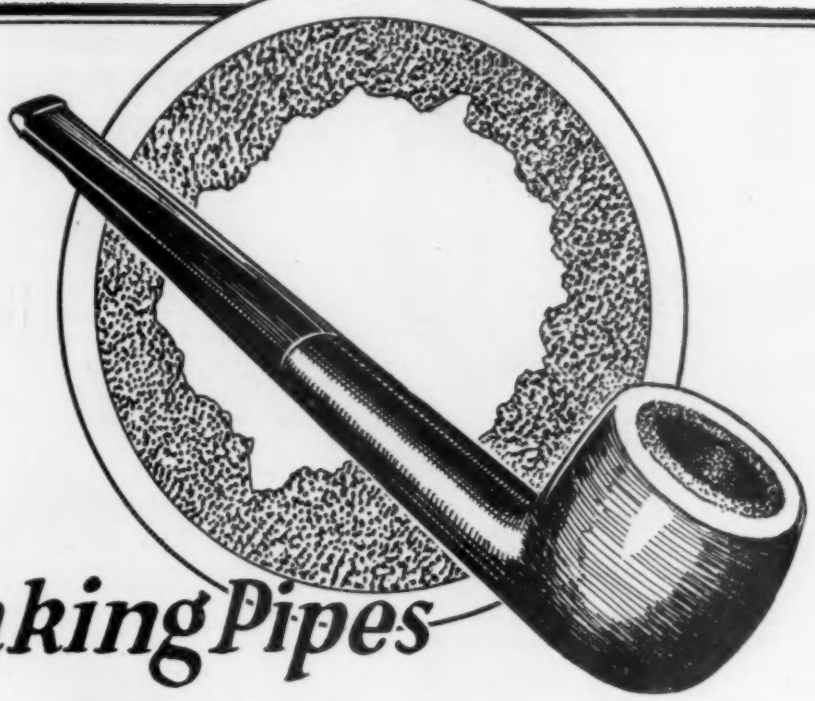
We find we are producing more current than was ever produced by the old Plant, and our fuel oil per day costs us less than $15.00. Our lubricating oil is costing less than $1.50 per day, our repairs are next to nothing and Seven men are all that are employed, including the Chief Engineer, three shift engineers and three helpers.

SALES OFFICES AT

412 Bisbee Bldg. JACKSONVILLE, FLA. | 1016 Baltimore Ave. KANSAS CITY, Mo. | 3006 Singer Bldg. NEW YORK CITY | 330 Humble Bldg. HOUSTON, TEXAS | 815 Sheldon Bldg. SAN FRANCISCO, CAL.

McIntosh & Seymour Corp.

MAIN OFFICE AND WORKS **AUBURN, N. Y.**



Caking Pipes

PIPES are alike and pipes are dissimilar. Your ol' "Jimmy-Pipe" which brings My Lady Nicotine will little by little become encrusted with a "cake" on the inside which tradition says adds to the flavor and can be removed with relative ease.

"Ordinary" Pressure Pipe also will little by little become encrusted with a "cake." Technically it is known as Tuberculation. But this certainly adds nothing desirable to the flavor of the water, can be removed only with the greatest difficulty and, in ten years or more, greatly lowers the carrying capacity of this pipe.

However, Lock Joint Reinforced Concrete Pressure Pipe has very little in common with pipe of the briar variety. It will not, it cannot "cake" or tuberculate—no, not even after twenty, forty or any number of years. Its inside walls always remain clean and smooth. Therefore its carrying capacity always remains constant and at the same original maximum.

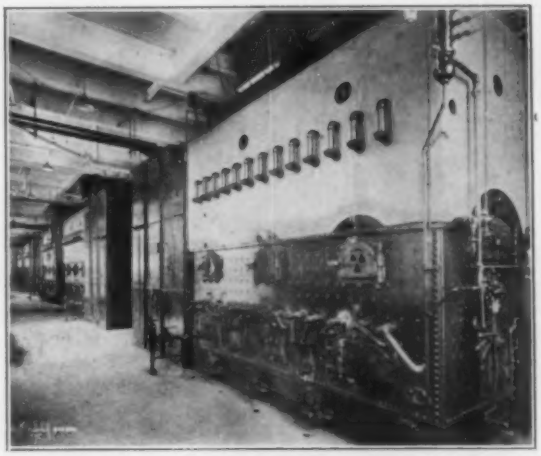
Lock Joint Pipe Company, 15 Rutledge Ave., **Ampere, N. J.**

Now-

LOCK JOINT
Reinforced
Concrete Pipe

Non-Tuberculating

40 Years Hence



This is the plant which has been installed for the City of New York at 56th Street and 12th Avenue. The equipment consists of six 50-ton Decarie Steel Water-jacketed Furnaces. The plant is normally rated at 300 tons per 24 hours.

This
DECARIE INCINERATOR BURNED
300 Tons in 13 Hours

The ash or residue is clean and sanitary. The refuse is reduced 94 per cent in volume, and the residue is discharged by means of dumping grates, directly from the clinker cooling chambers into steel ash cars which, in turn, discharge their loads by means of an automatic skip hoist, directly into trucks.

DECARIE INCINERATOR CORPORATION
342 Madison Avenue
New York City

Flap or Drain Valves
Plug Valves
Sluice Gates
Shear Valves

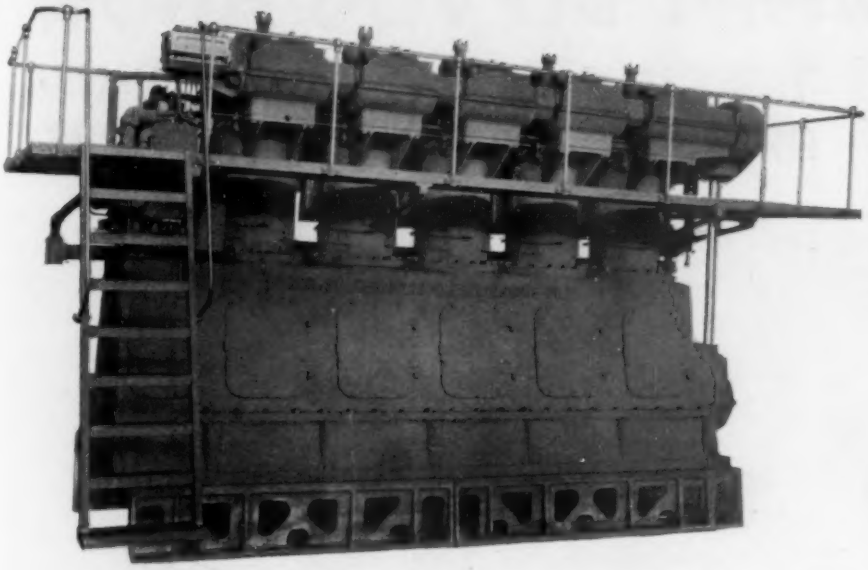
Coldwell-Wilcox Company
Water St. Newburgh, N. Y.

FEDERAL
WATER METERS

Sound design and superb quality commends the Federal to the judgment of practical waterworks men. They recognize that a new high standard has been established by this meter.

FEDERAL METER CO.
840-844 FOURTH AVE.
BROOKLYN, NEW YORK

CITIES THAT ARE INSTALLING DIESEL ENGINES



ESTHERVILLE, IOWA—

Started with 1—225-H.P. engine in 1914.
Adding 1—250-H.P. engine in 1920.
1—500-H.P. engine as illustrated above is now being installed.
They originally operated their municipal plant by steam.

MENASHA, WISCONSIN—

Bears the distinction of having the first municipal plant in the world operated by Diesel engines.

First installation.....2— 75-H.P. engines in 1905.
Second installation....1—225-H.P. engine in 1911.
Third installation.....1—225-H.P. engine in 1913.
Fourth installation....1—600-H.P. engine in 1924.

The 600-H.P. engine is like the one shown above with another cylinder added.

LAFAYETTE, LOUISIANA—

Is rebuilding its power plant, starting with 2—600-H.P. engines, direct connected to generators and making provision for another later on. At that time the old steam equipment, to be held as reserve for the present, will be scrapped.

Your City can save money if you use steam engines by putting in Diesels.

BUSCH-SULZER BROS.-DIESEL ENGINE CO.

60 Broadway, New York ST. LOUIS, MO. Rialto Bldg., San Francisco

WHAT DO YOU KNOW?

THAT IS A COMMON GREETING— APPLY IT TO YOUR WATER-WORKS

There Are Leaks in EVERY System

The only way to be absolutely certain that there are no blown-joints, leaky valves or illegal uses of water in your distribution system is to have it thoroughly surveyed by Pitometer engineers. A complete Pitometer survey of your system is a real economy, for you cannot afford to throw away coal to pump water which is not going to be used nor can you afford to impound it, filter it and chlorinate it to be wasted.

A PITOMETER SURVEY

is an accounting of your water supply. It will increase your revenue and prevent further losses. Send for our Bulletins 11 and 12 which contain a vast amount of interesting information.

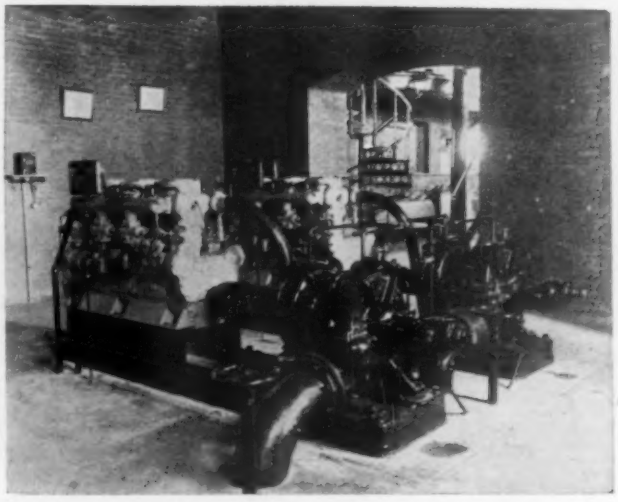
The
PITOMETER COMPANY
52 CHURCH STREET · NEW YORK

EMINENT AUTHORITY

Says: "With the gasoline engine driven pumps installed, it is expected that the coal bills each year will be reduced by $6,000. This is seen to compare very favorably with the installed cost of the two gasoline engine driven pumps which was approximately $13,000.

"In addition to the above saving, the fireman in charge of the boiler will be available for other duties."

Name on request.



Brockville, Ont. Babcock, Wilcox & Goldie & McCulloch pumps, each 2,450,000 Imperial gallons per day or 2,000,000 at 110 lbs. (fire pressure) using STERLING six-cylinder 5¾-inch bore engines at 1400 revolutions, over 200 H. P. developed.

Sterling Internal Combustion Engines

STERLING ENGINE CO.

Dept. C-11

Buffalo, N. Y., U. S. A.

Single units to 250 B.H.P. load,
1200 revolutions, $20 a horsepower.

Sterling
THE ENGINE OF REFINEMENT

45 East 55th Street
New York

130 East 57th Street
(Exclusive for Women)
New York

143 East 39th Street
New York

302 West 22nd Street
New York

ALLERTON CLUB RESIDENCES are monuments to the best ideals of refinement and distinction.

Collegiate atmosphere, the conveniences of ultra-modern equipment and the service of well-trained attendants attract university men from every section of the nation.

Their service accords with the ideals without taxing the means of college men.

Rates $2 per day With Bath $3 per day

New Fraternity Clubs Building
22 East 38th Street
New York

FRATERNITY CLUBS BUILDING
Madison Avenue—38th Street

The new seventeen story University Club residence devoted exclusively to college men. Roof Garden, Oyster Bar, Squash Court, Grille, Valet, Club Rooms, Lounges.

Rates: **$11 to $25 per week**
$2.50 per day upward

Huron St. & Michigan Ave.
Chicago

Supervision
BOARD OF GOVERNORS FRATERNITY CLUBS
Management
ALLERTON HOUSE COMPANY

JAMES STEWART CUSHMAN
President

WILLIAM HARTON SILK
Managing Director

ROTARY

NORTHERN PUMPS

Buy on
Performance—
Not Talk

For Most
Effective Service
Specify Northern

The Only Ones Who Dared!

The NORTHERN Rotary is the only pump, mounted on a commercial chassis, that ever has been submitted for the 12-hour Underwriters' Test before the Annual Convention of the I. A. F. E., the place of all places where a pump would have to make good or receive a bad black eye.

But we knew that NORTHERN Pumps could do it—*and they did do it*—passed the complete test with colors flying.

Patented lateral ports entirely prevent pulsation. Packing strips in the rotor teeth automatically feed out as they wear off, maintaining perfect contact with the cylinder walls. The rotors are driven by pilot gears outside the casing; both water gears are driven gears.

These are a few of the reasons why NORTHERN Pumps excel on the job, and perform with virtually undiminished efficiency year after year.

Get in touch with us now. Write today.

NORTHERN
ROTARY
PUMPS
"MORE GALLONS PER HORSE POWER"

NORTHERN FIRE APPARATUS CO.
MINNEAPOLIS, MINNESOTA. U.S.A.
900 18th Avenue, N. E.

Sunbury Paxinos Road, Pennsylvania

Freehold—Matawan Road, New Jersey.

The road that stands the gaff!

Many types of road-construction have been tried out during the past fifteen years. Test highways have been laid and subjected to every conceivable stress of traffic and weather-conditions.

Foremost among all hard-surface types, its economy proven by years of performance, is the properly designed and correctly constructed concrete road, with Carey Elastite Expansion Joints at regular intervals to absorb expansion stresses. Such roads have stood up with minimum maintenance costs under increasing weight of traffic.

Over 40,000 miles of concrete highway are completed, and concrete highway programs are expanding. The next few years will see a tremendous increase in concrete road construction.

But there will always be enough Carey Elastite Expansion Joint ready for prompt shipment to the job. Carey facilities for producing expansion joint are always well ahead of maximum requirements for concrete road construction in the United States.

Mullica Hill—Matawan Road, New Jersey

THE PHILIP CAREY COMPANY

8 Wayne Avenue, Lockland, Cincinnati, Ohio

Carey Elastite

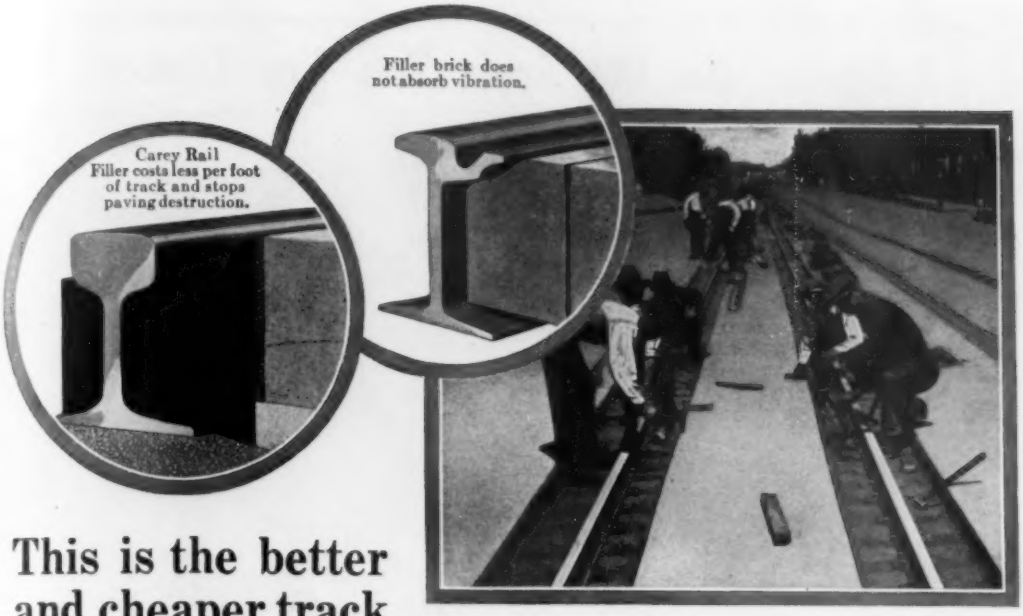
NAME REG. U.S. Patent Office

EXPANSION JOINT PROVED AND ACCEPTED

Send for this complete treatise on the use of expansion joint in concrete constructions and sample of Carey Elastite Expansion Joint.

Elastite Expansion Joint is an elastic resilient material composed of two sheets of asphalt-saturated felt between which is "sandwiched" a body of carefully refined asphaltic compound.

12-24



This is the better and cheaper track

ORDINARY T-rail with Carey Elastic Rail Filler used as a cushion and flange-way costs less per foot of track than groove rail and special nose brick. And it is far better, more durable—a real protection for the paving. The resilient cushion of Elastite Rail Filler absorbs the impact and vibration that destroys your paving, materially reduces traffic noise, means smoother riding for passengers and less wear on cars.

Now you have a shock-absorbing rail filler—ideally efficient in service and less expensive than any makeshift or experimental material.

Write for prices and further information.

THE PHILIP CAREY CO., 54 Wayne Ave., Lockland, Cincinnati, Ohio

Elastite Rail Filler is easy to install. A tap of a mallet sets it in the web of the rail. Carey Elastite Rail Filler is a composition of specially tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail vibration, and track noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

NAME REG. U.S. Patent Office

RAIL FILLER

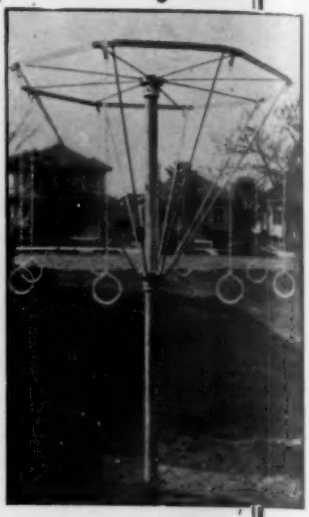
6-24

Remember the Old Apple Tree You Climbed?

Children of all ages, in all times, have liked to climb trees, and swing from limb to limb.

The little girls in the picture are having a "grand" time on the **SAFETY CLIMBING TREE,** without danger of accident to themselves or their clothes.

And on the **CIRCLE TRAVEL RINGS,** they can swing from "limb to limb," pulling, stretching and developing every muscle in their bodies. Instructors pronounce this the most healthful device yet offered.



Drop a post-card in your mail-box asking for our complete illustrated catalog.

PATTERSON-WILLIAMS MANUFACTURING CO.
SAN JOSE **CALIFORNIA**

Why do so many cities adopt Canco Galvanized Ware?

Canco Garbage Pails and Cans are made in seven stock sizes — or we can furnish them to meet any specifications. Canco Galvanized Ware includes also street cleaning cans, trash cans and rubbish burners, in many styles and sizes.

BECAUSE it is solid—not flimsy. It lasts. It lasts so long that it is far cheaper than "cheaper priced" ware.

The progressive spirit that adopts the most sanitary method of handling refuse, adopts quality containers. Why? They serve best, longest, and are therefore cheapest. That's why so many cities adopt Canco.

Canco garbage cans, pails, rubbish burners are ruggedly built. They endure.

Let us refer you to cities that have used Canco Galvanized Ware. For further information and prices address

Galvanized Ware Department

American Can Company

Toledo, Ohio

TRADE CANCO MARK

SAFETY
DURABILITY
BEAUTY
PLAYABILITY
Write for Catalog

CYCLONE

"Galv-After" Chain Link
FENCE FABRIC

Points of Superiority

HEAVILY ZINC-COATED (OR HOT-GALVANIZED) BY HOT-DIPPING PROCESS AFTER WEAVING. NO ANNUAL PAINTING.

ZINC COATING IS APPROXIMATELY 5 TIMES AS HEAVY AS THAT APPLIED TO CHAIN LINK FABRIC MADE FROM COMMERCIAL WIRE GALVANIZED BEFORE WEAVING.

ZINC COATING IS UNIFORM. ALL POINTS PROTECTED. NO LUMPS. NO FROZEN OR SOLDERED INTERSECTIONS.

Cyclone "Galv-After" Chain Link Fence Fabric effectively resists corrosion. Gives maximum property protection with minimum upkeep expense. Beautifies as well as protects. The economical, enduring fencing.

We also manufacture Iron Fence for all purposes.

Write Nearest Offices, Dept. 46.

Cyclone Fence Company

Waukegan, Ill.; Cleveland, Ohio; Newark, N. J.; Fort Worth, Tex.

Western Distributors:

Standard Fence Co., Oakland, Calif.
Northwest Fence & Wire Works, Portland, Ore.

Trade Mark

PROPERTY·PROTECTION·PAYS

Prevention!

—the first law of drinking sanitation

The best way to avoid drinking contamination is to *prevent* it. Modern cities everywhere are using R–S Vertico Slant Fountains for every public drinking need. They provide positive sanitation even among careless drinkers, because *lips cannot touch the nozzle.* The source of most drinking contamination is automatically eliminated. This is the ideal fountain for parks, schools, playgrounds, comfort stations and other civic buildings where many people gather.

Write for catalog with prices, specifications and complete information on the entire R–S line of fountains and plumbing fixtures. It will be gladly sent upon request.

RUNDLE-SPENCE MFG. CO.

53 Fourth Street **Milwaukee, Wis.**

"Lips can't touch the R-S nozzle"

The World's Greatest Iron Fence Builders

Experience Makes Perfect

Safeguard Your Reservoir With a STEWART Iron Fence---

a fence that is BEAUTIFUL—
and PERMANENT—
and STRONG against unlawful invaders.

Our long experience of forty years qualifies us—
to advise you as to the type of fence best adapted to your particular needs,
to submit designs from our own draughtsmen or to use your specifications, and
to give PROMPT SERVICE AT PROPER PRICES.

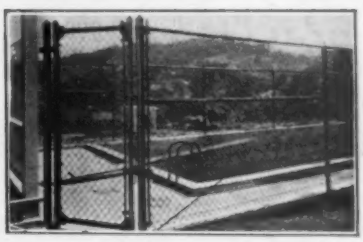
Protect the Children's Playgrounds, Too.

A practical fence for parks and playgrounds, as well as for municipal waterworks, sewage disposal plants, golf courses, tennis courts, etc., is the STEWART Chainlink Wire Fence, made of genuine open-hearth galvanized fabric with interlocking mesh, with fittings of pressed or forged steel.

Are Your City's Park and Cemetery Entrances Beautiful?

The world's most beautiful designs in ornamental iron fences and gates are available for your city's use in our "Book of Designs C." Hundreds of these fences and gates have been installed by municipal cemeteries.
Let us know your requirements in either Iron or Chainlink Wire Fence, and we will submit designs and estimates of cost.

THE STEWART IRON WORKS COMPANY, INC.
216 STEWART BLOCK **CINCINNATI, OHIO**
"The World's Greatest Iron Fence Builders"



NOTICE

It will be decidedly to your advantage to get a copy of our catalogue "L", showing the many designs of BAUSMAN BETTER BENCHES and THE NEW HEAVY PARK SWING, before you make up your next specifications.

We are specialists in bench and swing building and all of our designs have been thoroughly tried out.

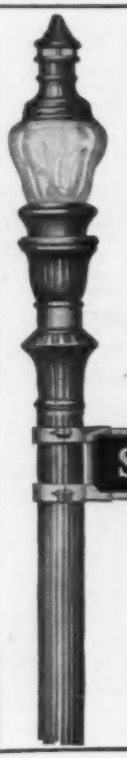
(Bench Makers for More Than a Quarter Century)

The Bausman Manufacturing Co.
Millersville, Pa.

CARROUSELS

Look Well
Pay Well
} **In City Parks**

Philadelphia Toboggan Company
AMUSEMENT PARK ENGINEERS
Manufacturers and Builders of
CARROUSELS-COASTER-WATER RIDES
GERMANTOWN, PHILA.
PENNA.



IS it not true that the most desirable sign for Municipal use must have legibility, then permanence and by permanence we mean a sign that requires no attention after it is once placed? To the best of our knowledge this is the accomplishment of the EVERNU Sign.

Municipalities please state your requirements. If it's a sign we have it.

The Evernu Century Sign Co.
100 Colonial Road
BOSTON, MASS.

Between Safety and Sorrow

— an Anchor Playground Fence

Out on the roadways sorrow lurks. But carefree youngsters pay but little heed to speeding cars.

At playtime, children need the protection that an Anchor Playground Fence affords.

Choose between safety and sorrow for the children of your city or town. See that your playgrounds are effectively fenced.

Anchor Chain Link Fences provide enduring playground protection. To prevent rust, they are heavily galvanized throughout. Their fabric is rust-resisting copper alloy steel wire—galvanized *after weaving* as a double safeguard against corrosion. Posts of steel are *drive-anchored.*

The nearest Anchor office or sales agent is at your service.

Safe from traffic dangers. Municipal Playground, Bayside Park, Jersey City, N. J.—Anchor Fenced.

ANCHOR POST IRON WORKS

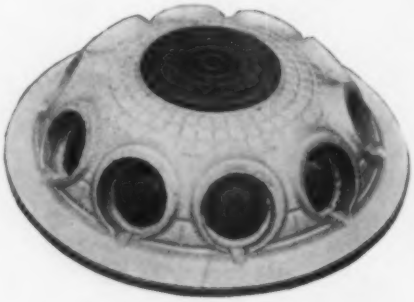
52 Church Street — New York, N. Y.

BALTIMORE	EUCLID, O.	PHILADELPHIA
BOSTON	DETROIT	PITTSBURGH
CHICAGO	HARTFORD	WILKES-BARRE
CINCINNATI	MINEOLA, L. I.	ST. LOUIS

Sales Agents in Other Cities

Anchor Fences

POSTS ~ Drive Anchored FABRIC ~ Galvanized *After Weaving*



A DWARF FOR SIZE; A GIANT FOR RESULTS

THE LEHMAN TRAFFIC GUIDE is only 5½ inches high.

Therefore it cannot injure in any way a vehicle that is accidentally driven over it.

It cannot be damaged by the heaviest loaded truck.

It is conspicuous enough to attract the motorist's eye at ample distance, day or night.

At night, it is lighted through ten ruby lenses 3½ inches in diameter.

Further particulars of this practical, durable and economical guide are given in our Traffic Guide folder.

Shall we send you a copy?

ELKHART FOUNDRY & MACHINE CO.
ELKHART INDIANA

Hazard
RUBBER INSULATED
WIRES & CABLES

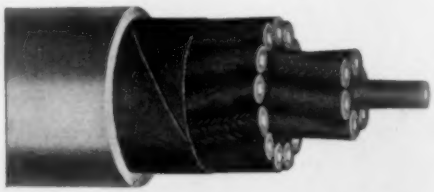
For Traffic Signals, Fire Alarm Telegraph or Police Signalling.

Hazard Lead Encased Steel Taped Cables

For underground systems where no conduit is used.

Hazard Spiralweave Cable

For overhead Construction



Hazard Lead Encased Cables

For underground conduit systems.

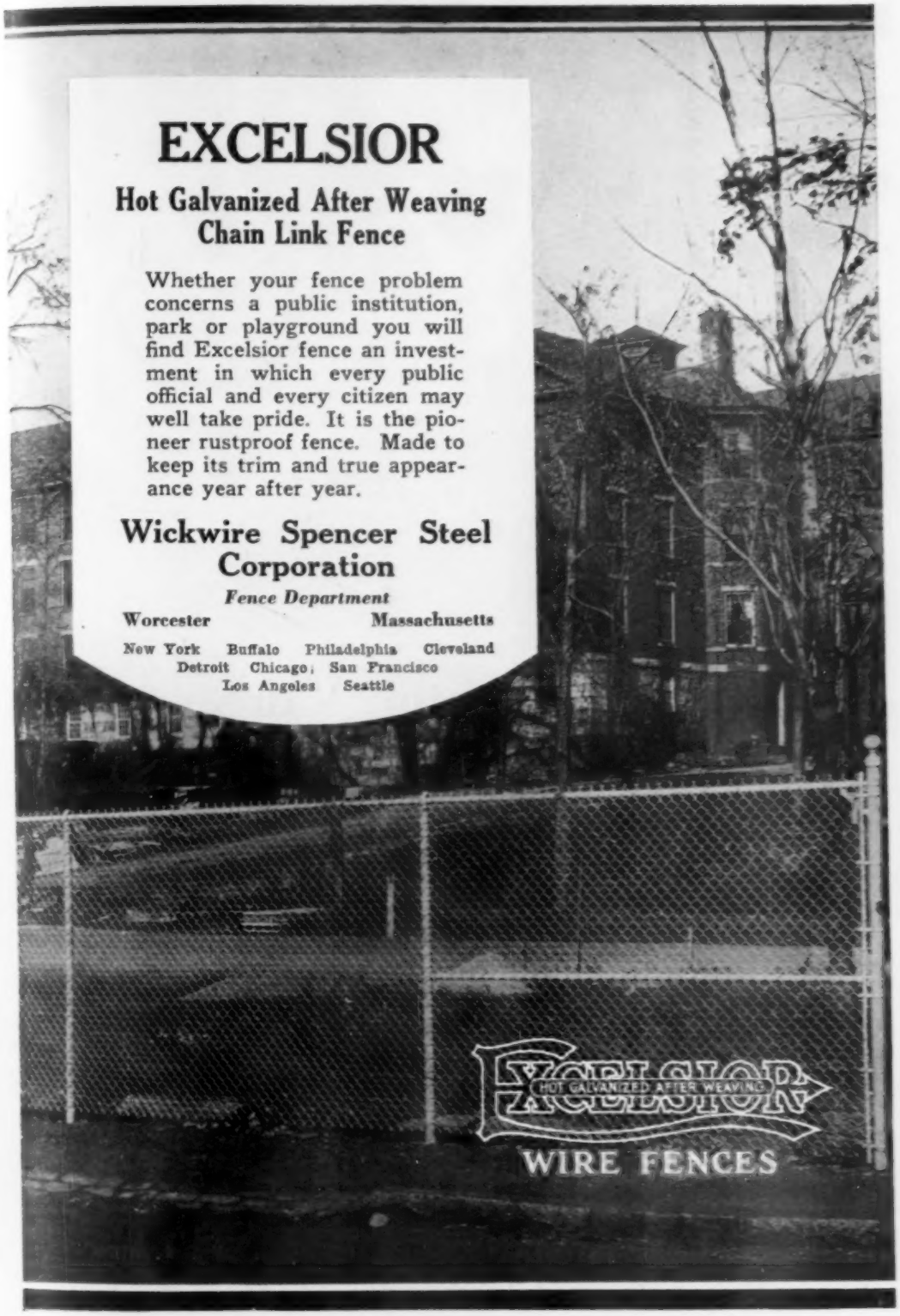
WHEN YOU WANT BETTER CABLE, YOU'LL BUY HAZARD

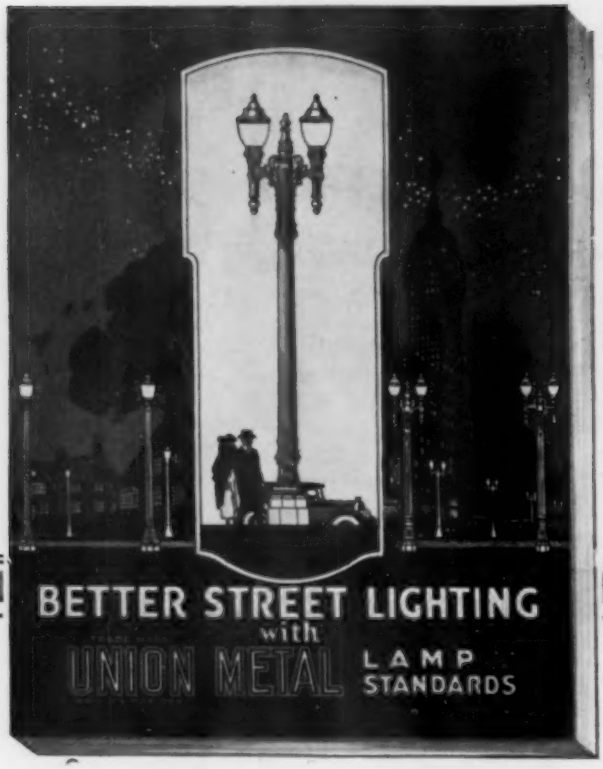
"Made for users who want the best"

Established 1848

HAZARD MFG. CO.
Wilkes-Barre, Pa.

New York - Chicago - Pittsburgh
Denver - Birmingham


EXCELSIOR
Hot Galvanized After Weaving
Chain Link Fence
Whether your fence problem concerns a public institution, park or playground you will find Excelsior fence an investment in which every public official and every citizen may well take pride. It is the pioneer rustproof fence. Made to keep its trim and true appearance year after year.
Wickwire Spencer Steel Corporation
Fence Department
Worcester Massachusetts
New York Buffalo Philadelphia Cleveland
Detroit Chicago San Francisco
Los Angeles Seattle
HOT GALVANIZED AFTER WEAVING
WIRE FENCES



Your Copy of this Valuable Book is Now Ready

Anyone interested in the better lighting of business districts, residential streets, parks, boulevards and highways will want a copy of our new 100-page street-lighting catalog.

It is by far the most comprehensive lighting standard book ever distributed, and should be in the hands of every official who is interested in making his city Brighter, Safer and More Beautiful.

Write today for "Better Street Lighting" Book No. 52.

The Union Metal Manufacturing Co.

CANTON, OHIO

UNION METAL
LAMP STANDARDS

Sketch model for Washington's new 2-light luminous arc standards.

General Electric Engineers Help Make Nation's Capital One of World's Best Lighted Cities

For the past year engineers and designers from the G-E Illuminating Engineering Laboratory have been co-operating with government officials and the special committee appointed by the Engineer Commissioner to study the lighting needs of the District of Columbia.

Final approval by the Commission of Fine Arts covering the designs of standards and fixtures gives Washington a comprehensive street lighting plan which will make it ultimately one of the best lighted cities of the world.

15C-16PC

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

105. K & S Automatic Stop and Go Regulators control traffic in the City of St. Louis

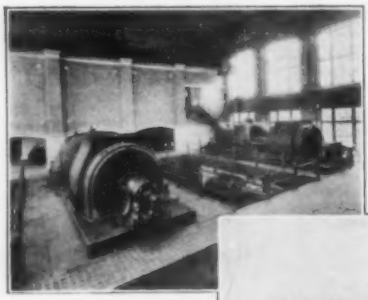
After Experimenting with a varied assortment of traffic regulators they have standardized on K & S signals because with them the command in Letters and Colors is in line with the drivers' vision.

The Center Type for the middle of the street and the Corner Type for narrow streets or at street car intersections are both being adopted in many cities as standard.

Synchronized systems given careful personal attention.

Let us solve your traffic problems.

KLUG AND SMITH CO.
Milwaukee, Wis.



WIRED WITH SIMPLEX

Penn. Central Power Co.
Saxton Substation

Day & Zimmermann, Inc., Engrs.

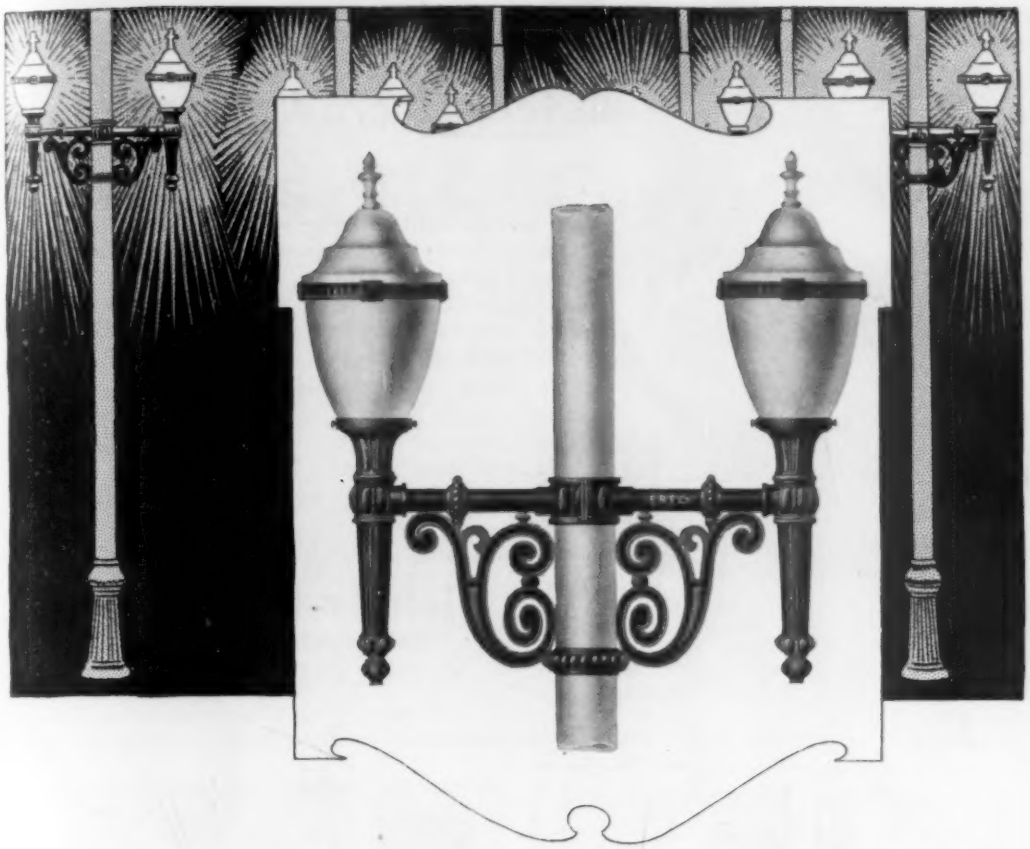
Simplex Wires and Cables are rendering satisfactory service in many of the larger power stations of the country. Insulated with rubber, paper or varnished cambric and covered with braid, lead or steel armor, they are made for the particular conditions under which they are installed.

Why not submit your specifications to us?

SIMPLEX WIRE & CABLE CO.
Manufacturers
201 Devonshire St. Boston

Chicago
San Francisco
New York

Factory
and Main Office
at Boston



For thirty-two years, Elreco Tubular Steel Poles have been used by street railways.

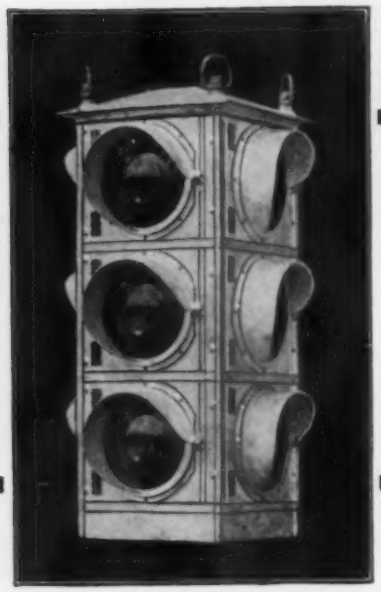
We now offer the Combination Railway and Lighting Poles. These have ornamental brackets and fittings which have been designed and assembled as a complete unit in our factory. Thus, ease of installation and complete satisfaction to the user are insured.

The design of the General Electric lighting fixture is carried out exclusively in our bracket design.

The Electric Railway Equipment Co.

NEW YORK OFFICE:
30 CHURCH STREET

Cincinnati, Ohio



NOW!

Actual Traffic Control

The new M. J. Leary Indicating Traffic Signal Lantern brings it. Combines a genuinely efficient directional performance with an actual "400% Safety" for drivers, pedestrians and officers alike. A lantern which provides for an immediate stoppage of traffic from all sides to give instant right-of-way to police and fire apparatus.

The Leary Lantern weighs but 135 pounds, in spite of its 3 foot height. Cast aluminum construction accounts for its light weight . . . . . and insures long service.

Furnished for either manual or automatic control.

Manufactured and Distributed by

The Nichols-Lintern Co.

7960 Lorain Ave.

CLEVELAND, OHIO

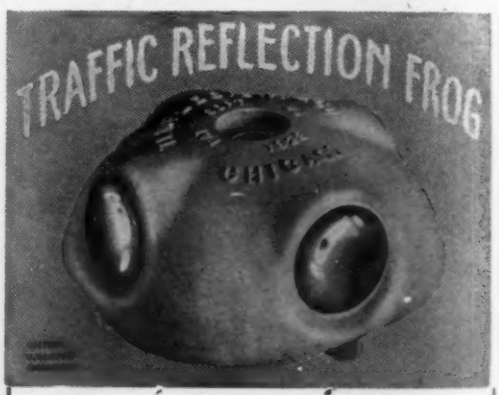
DIXON'S SILICA GRAPHITE PAINT

for economical protection of standpipes, bridges and other exposed metal or wood work. Dixon's Paint can not be excelled. It will give better paint protection because of the pigment flake silica-graphite.

Write for Booklet 107-B.

JOSEPH DIXON CRUCIBLE COMPANY

Jersey City, Established 1827 New Jersey



First Cost; Only Cost

Every auto is provided with sufficient light for its own safety. Make use of this display of light. Any light will light up the "Frog" to a safe distance. The "Frog" is unsurpassed as a marker Button, Traffic Regulator or Safety Zones for Street Cars. Can be removed for snow plows, street machinery, etc. Try one. Money back on sample if not satisfactory.

TEMPLE SIGNAL CO.

Box 1671 Office: 5525 Park Ave.,

INDIANAPOLIS, IND.

Read It In Your Own Newspaper

Auto Hits Two Children at Lincoln School
Driver Fails to See Zone Marker
A car driven by Leland West, a chauffeur, this morning ran into Betty Brown, 19 W. 5th St., and Louise Crainer, 223 Pine Ave., pupils of the Lincoln School as they were crossing the street directly in front of the school.
West was driving down Lincoln Blvd. at a rate of speed estimated at approximately twenty-five miles an hour and not knowing that he was approaching a school did not slacken up his speed.
The lower grad
for recess and as
running across
tionery West sa
and turned his
but they becam
back directly
chine and w
pavement.
injuries.
West claim
zone marke
PARENTS DEMAND ACTION AFTER CHILD'S DEATH AT SCHOOL
Mr. and Mrs. Broneon whose little 6 year old son Jack was killed Thursday when he was run down by a truck belonging to the S. Deyo Co., have filed suit for damages.
Witnesses claim that the boy was leaving the Parker school at noon with his sister when an auto truck driven by Joe Shelby turned the corner at Franklin and Green Sts. and the driver in trying to avoid hitting the girl who became confused and ran back, swerved to the extreme left of the street, striking her brother who ran ahead, killing him instantly.
Shelby
en any school
he vicinity of
was impossible
account of the
me of the ac-
TRAFFIC SIGNS NOT VISIBLE
City May Be Forced to Act
The parents of pupils at the 10th Ave. School are greatly agitated over the unfortunate accident last week which resulted in the death of little Bettrice Sellers, age 9.
The coroner's jury found Con. Wright not responsible although he was the driver of the "death
The school sign
metal propositions
worn and was
Wright did not kn
proaching a school.
The jury further
in front of all schoo
warning signs whic
danger to the scho
Playgrounds Will Have Traffic Lights Hereafter
Protection for Schoolchildren
As a result of the accident that occurred yesterday to Sarah Fraser who was run over by a delivery truck while she was roller skating down the driveway from the playgrounds of the Columbus School, the Board of Public Welfare today passed a bill providing for the installation of automatic school warning signals to be erected near all schools. A decision to the effect was reached after it was declared that the driver of the truck was irresponsible for the accident because there was no sign to give him warning of his oncoming approach to a school.

Every year thousands of school children are injured by passing automobiles. Each newspaper account of such an accident is an indirect appeal to the loyal citizens, public officials and parents for protection.

Signs are useless unless there is some positive means supplied of focusing and attracting the driver's eye.

The Essco Warning Signal supplies this need. The illuminated flashing signals make certain that traffic cannot pass these units without catching the caution and warning of danger.

Visit our Exhibit at the Good Roads Show, Chicago, Illinois, January 5-9.

ESSCO Manufacturing Co.
110 HARRISON STREET
PEORIA ILLINOIS
Pioneer Builders of Guaranteed Traffic Equipment

TURTLE BACK SILENT TRAFFIC OFFICER
Unequalled for Wide or Narrow Streets
Safety Islands · Bridge Approaches
Sharp or Narrow Turns
Intersections, with or without tracks
Indispensable in Heavy Traffic
Write for Special Offer
UNION IRON PRODUCTS CO.
EAST CHICAGO
INDIANA

BRAXMAR BADGES

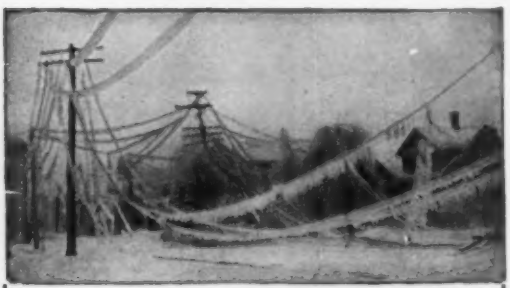
Police, Fire and Municipal Badges in all Metals—Fully Illustrated Catalog.

C. G. BRAXMAR CO., Inc.
10-12 Maiden Lane New York

Plain and Ornamental Iron and Wire Work of every description—Steel and Iron Fencing. Entrance Gates, Door and Window Guards—Railing, Gratings—Wire Partitions—Iron Shutters, Folding Gates, etc.

Designs and estimates submitted on request.

CINCINNATI IRON FENCE CO.
3348 Spring Grove Ave., Cincinnati, O.



WHY TAKE THE RISK WHEN

"COPPERWELD"

TRADE MARK REG. U.S. PAT. OFF.

Weatherproof Wire on Your Police and Fire Alarm Circuits Gives Greater Safety and Costs Less Per Mile Year than Solid Copper or Iron Wires.

LINE WIRE—TWISTED PAIR—GROUND RODS

Data on Request

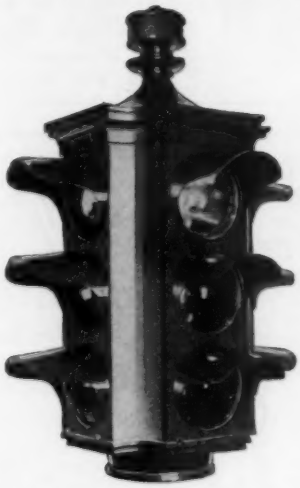
COPPERWELD STEEL COMPANY
(FORMERLY NAMED COPPER CLAD STEEL COMPANY)
30 Church Street, New York 129 S. Jefferson St., Chicago
403 Rialto Building, San Francisco
Main Offices—Braddock P. O., Rankin, Pa.

If it takes two men eight hours to paint one thousand feet of traffic line by hand, but only ten minutes for a thousand feet with the A. B. C. Traffic Line Marker, why not save this difference.

It can be done because others have done it and we can prove it.

The Highway Appliance Co.
(INCORPORATED)
155 Pine Street, Providence, R. I.

Pay YOUR CITY a Visit



Visit our exhibit at the Good Roads Show, Chicago, Illinois, January 5-9.

Stand on the curb of your own city, forgetting for a moment that you have seen its streets and traffic before.

Does it make an impression on you or do the traffic jams and muddles seem a bit old-fashioned and inefficient—not quite indicative of your city's real character.

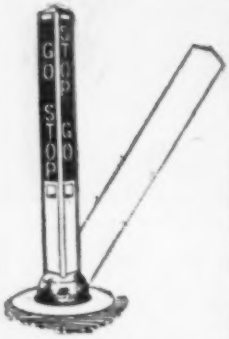
Conditions today in the average city require safe and positive control of traffic. Old ideals and methods must go—traffic in the present rapid stage can only be positively guided when automatic traffic control units are used.

ESSCO Manufacturing Co.
110 HARRISON STREET
PEORIA ILLINOIS
Pioneer Builders of Guaranteed Traffic Equipment

The "American Bobby" Traffic Regulator

"Goes down when struck—Bobs up when released."

THE AMERICAN BOBBY IS THE ONLY SAFE STREET SIGNAL.



It is held in position by two sets of steel springs, which allow it to yield when struck, and bring it back into place when the car has passed on.

The American Bobby uses a minimum of street space. It is the only signal which can be installed between street car tracks. It will stand hard treatment, because it is built of structural steel.

Write for literature and a list of the cities where our signals are installed.

GRISWOLD SAFETY SIGNAL CO.

20 East Hennepin Avenue, Minneapolis, Minn.

Redflex

WARNING SIGNALS

Reflects Auto Headlights

Positive — Reliable

If It Isn't Square It Isn't Redflex.

CENTURY

Street Signs
Road Markers
Special Signs
in
Alloyed Aluminum

THE AUTOMATIC SIGNAL and SIGN COMPANY

1014 S. Michigan Ave., CHICAGO
And SAN FRANCISCO

Climax house numbers are being adopted by many municipalities. They are easily installed, inexpensive and durable.

Climax house numbers consist of pure aluminum numerals, 3 inches high, set in a black Japanned frame.

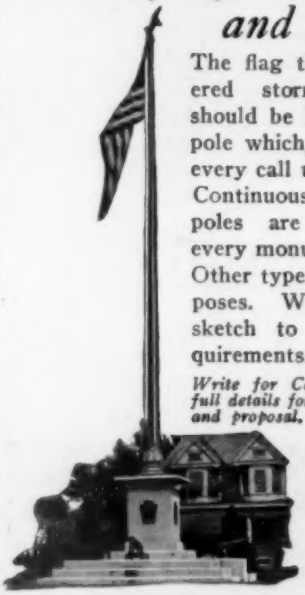
Write for prices and further information.

The Hamilton Metal Products Co.
Hamilton, Ohio

Climax **HOUSE NUMBERS**

STEEL POLES

Worthy of the Stars and Stripes



The flag that has weathered storm and strife should be held aloft by a pole which, too, can meet every call upon its calibre. Continuous taper welded poles are designed for every monumental project. Other types for other purposes. We will submit sketch to meet any requirements.

Write for Catalog today. Give full details for installation sketch and proposal.

The Pole and Tube Works, Inc.

Exclusive Pole Specialists

NEWARK, N. J.

Concord's New Hotel

Is YOUR Town As Good As Concord?

Concord, N. C., is a GOOD town! Its people are aggressive, keen, and wide awake to their opportunities.

Concord saw countless motor tourists step on the gas when they struck the town. Few stopped over because Concord had no modern hotel facilities. Which was too much for Concord. If all it took to make these tourists stop over was a good hotel, they'd get the hotel.

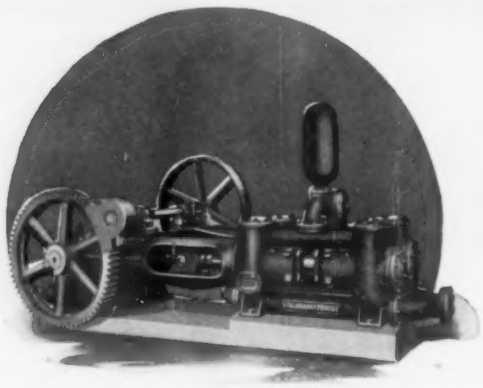
And they did! Through Hockenbury direction, in one week's time, $382,200 in hotel securities was sold to meet an objective of but $250,000. Their new hotel will soon be built and completely furnished without a cent of indebtedness.

If YOUR town faces a hotel problem, unquestionably Hockenbury Service is your logical answer. At any rate, ask us to place your name and the names of other civic leaders on our complimentary Civic list "C-12" to receive each month a copy of THE HOTEL FINANCIALIST, a neat little journal devoted to community hotel finance.

The HOCKENBURY SYSTEM *Incorporated*

Penn-Harris Trust Bldg - Harrisburg, Penna.

HIGH EFFICIENCY *and* RELIABILITY



8x12 Duplex Center-Packed Plunger Pattern Pump, arranged for belt drive

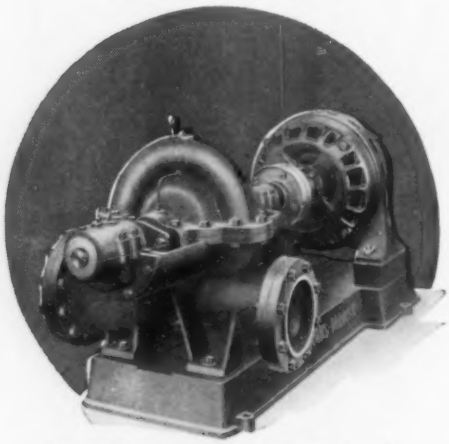


Fig. 800E—Single Stage Centrifugal Pump, direct driven by Fairbanks-Morse Ball Bearing Motor

FAIRBANKS-MORSE Pumping Equipment, because it carries the experience of years of careful design, accurate manufacture and conscientious application, assures most satisfactory performance. Every step of manufacture is checked to meet rigid requirements, and before shipment each pump is tested under actual service conditions by seasoned engineers, on the most modern test floor in America.

Built Complete by Fairbanks-Morse

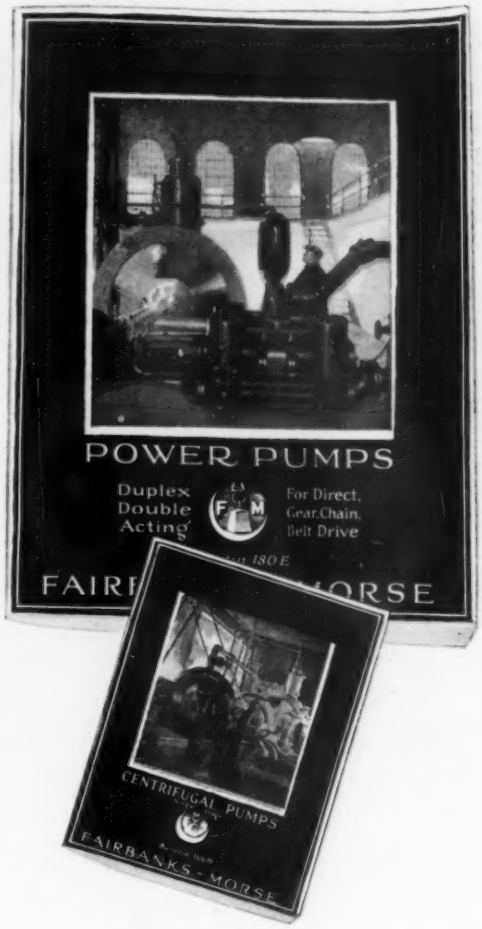
Smoothness and accuracy of all castings are insured, being produced by F-M foundries—jigs and fixtures obtain uniformity and interchangeability of parts. Careful finishing of all water passages reduces frictional losses—special machines are used to balance every impeller. Fairbanks-Morse Pumps come to you ready to serve according to the requirements outlined in your specifications—with a reputation that justifies your confidence.

FAIRBANKS-MORSE PUMPS

For the Man

whose opinion on pumps carries weight

THESE two new 48-page Bulletins contain the latest information on Fairbanks-Morse Power and Centrifugal Pumps — as well as useful information and tables for the man responsible for the installation and care of the pumping equipment.



Fairbanks-Morse Service Is Nation-wide

In addition to the Fairbanks-Morse "30 Acres of Pump Factory" where every modern facility is available for production purposes — every part of the country is served by the F-M Branches, the principal ones of which are listed below:

Atlanta, Ga.	Louisville, Ky.
Baltimore, Md.	Milwaukee, Wis.
Boston, Mass.	Minneapolis, Minn.
Chicago, Ill.	New Orleans, La.
Cincinnati, Ohio	New York, N. Y.
Cleveland, Ohio	Omaha, Neb.
Dallas, Texas	Portland, Ore.
Denver, Colo.	Salt Lake City, Utah
Des Moines, Iowa	San Francisco, Calif.
Detroit, Mich.	Seattle, Wash.
Indianapolis, Ind.	Spokane, Wash.
Jacksonville, Fla.	St. Louis, Mo.
Kansas City, Mo.	St. Paul, Minn.
Los Angeles, Calif.	Stuttgart, Ark.

FAIRBANKS, MORSE & CO.
Manufacturers
CHICAGO

Mail the Coupon for Your Copies

Fairbanks, Morse & Co.
Chicago, Ill.

Gentlemen:—
Send a copy of F-M Bulletin checked below:
☐ Power Pumps
☐ Centrifugal Pumps

Mail to:_____

FAIRBANKS-MORSE

KUHLMAN SERIES MULTIPLE STREET LIGHTING SYSTEMS

Assure more economical and efficient lighting

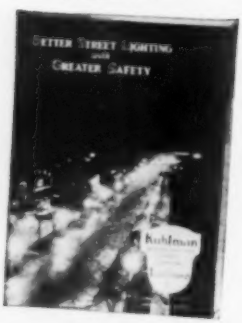
Kuhlman Series Multiple Street Lighting Systems are easily and quickly installed.

Their maintenance cost is low. For instance, the transformers being totally disconnecting, a wrench is the only tool needed to break the line. To hook it up again it is unnecessary to wipe on the joint.

Safety is one of the outstanding features of the Kuhlman Series Multiple Street Lighting System. You have high tension in the ground, low voltage up the pole. The pole can be knocked over without danger from high voltage currents to those involved in the accident or to passers by.

Kuhlman Series Multiple Street Lighting Systems add to the life of lamps. They mean better street lighting. And better street lighting pays big dividends in the form of safe streets.

Send for your copy of Bulletin No. 510

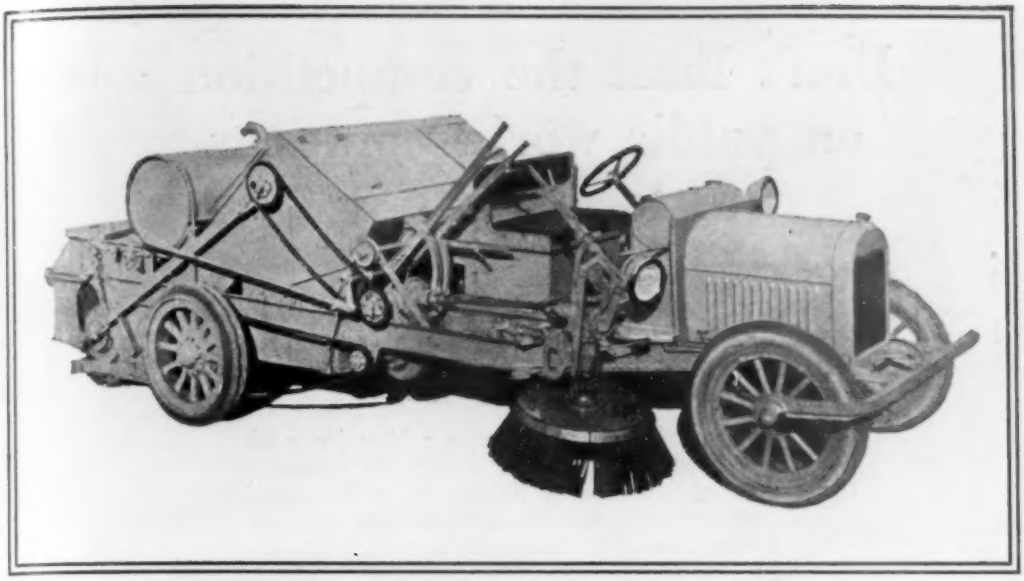


Kuhlman Disconnect Series Multiple Transformer

KUHLMAN ELECTRIC COMPANY
BAY CITY MICHIGAN

Manufacturers of Power, Power Distribution and Street Lighting Transformers

KUHLMAN TRANSFORMERS



Operated entirely by one man, the Childs Motor Pick-up Street Sweeper *sprinkles, sweeps up, and carries away all dirt and litter*

Where pride and budget agree

QUITE often, municipal pride is one thing, and the budget is another. But with the *Childs* Motor Pick-up Street Sweeper you can keep inside your budget and still have streets to be proud of.

Actually, cleaner streets at less cost to the taxpayer—because this highly efficient one-man machine does more and better work than a score of "white-wings" can do.

The many improved features include a revolving gutter-broom that follows the curb line automatically; a non-clogging conveyor; a wide, strong, rear pick-up broom; flexible handling in traffic; ample power and speed.

Before you make up your 1925 budget, write for complete specifications of the *Childs* Motor Pick-up Street Sweeper—*a whole street cleaning department in itself.*

Foamite-Childs Corporation

Engineers and Manufacturers

75 Turner Street, Utica, N. Y.

Sales and Engineering Representatives in the leading cities of the United States

Don't limit the competition on public works contracts to local bidding

Contractors, manufacturers and others elsewhere are eager to bid and are often prepared to submit lower offers than local bidders. If you want real competition and the lowest price, give them a chance to figure on your contracts also.

Only recently the low bidder on a New Jersey job was a Pennsylvania contractor, a Nebraska contractor was awarded a contract in Illinois, and a Washington bridge contract was let to a Pennsylvania bridge company. Many other cases of this kind could be cited.

Advertising your contracts *Nationally* not only opens the way for additional and possibly lower bids, but, as one city official stated it, local bidders "sharpen their pencils" when they learn that the work is being given wide publicity.

For 50 years contractors, manufacturers and others everywhere have consulted the Official Proposal Columns of ENGINEERING NEWS-RECORD each week for opportunities to bid on work, materials and supplies. Today many depend entirely upon the announcements printed here. ENGINEERING NEWS-RECORD publishes more Official Proposal advertisements annually than appear in all other contractors' papers combined.

ENGINEERING NEWS-RECORD—through its circulation of over 30,000 copies weekly—will bring your contracts to-be-let to the attention of the largest number of interested prospective bidders—local and elsewhere—that can be reached through any one publication.

Engineering News-Record

The Dominant Proposal Advertising Medium

10th Ave. at 36th St., New York

Rates—detailed circulation, sample copy, etc. on request.

Annual subscription rate to any part of the world, $4.00. Back numbers available.

HAROLD S. BUTTENHEIM, Editor
THEODORE R. KENDALL, Secretary and Engineering Editor
M. V. FULLER, Associate Editor

Published Monthly by
The Civic Press
443 4th Ave., New York

EDGAR J. BUTTENHEIM, President and Manager
HERBERT K. SAXE, Treasurer
L. P. ANDERSON, Advertising Manager

The American City Magazine

Branch Offices:
Chicago
123 W. Madison St
TOM DIX, Vice-President
San Francisco
320 Market St.
W. A. DOUGLASS, Representative

Vol. XXXI — INDEX TO CONTENTS, DECEMBER, 1924 — No. 6

Accident Prevention
Notable Reports on Highway Safety.... 588
Public Safety Division of a Chamber of Commerce 593
More Letters on Safety at Railroad Crossings 607

Bill-Boards
An Ordinance to Regulate Outdoor Advertising 585

Chamber of Commerce Activities..... 585
Achievement Day Program of Farm Bureau. 586
National Association of State Chambers of Commerce Organized..... 599

Christmas Observances by Municipalities... 600

City and Regional Planning and Zoning
Fields of Legislation for City Planning... 525
Niagara Frontier Planning Association.. 539
Suburban Subdivision, Sheffield, England. 580
City Planning—The City Practical..... 585
Map-Making for Zoning by Civics Pupils. 592
Zoning Notes 602
St. Louis Backs Up Its City Plan Commission 603

Civic Service
A City Club's Weekly Luncheon Programs. 558
Hotel Financed by Community 586
Stadium Financed by Selling Advertising Space 587
Bringing Business Men into the Picture.. 589

Conventions 621

Election Results 613

Finance, Municipal
Allentown Realtors Help Save Taxpayers' Money 558
The Municipal Bond Market..... 605

Fire Prevention and Control
Selecting Our Fire Fighters..... 528
Training a Dynamite Squad, Fresno, Calif. 548
Recent Fire Alarm Improvements..... 631
Fire Pump on Auto Running-Board..... 633

Forward Steps in Municipal Affairs..... 548

Government, Municipal
Cincinnati Adopts P. R. Manager Government 534
City Manager's All-Star Cast..... 552

Health and Sanitation
Far Western Child Health Demonstration. 532
Pamphlets on Child Care Replace Health Department Bulletin 550
Racial Groups and Public Health..... 570
Community Values in Christmas Seals.... 584
The Cost of Public Health..... 594

Highways
Oiled Earth Roads on Long Island..... 530
Wear of Concrete Pavements Tested..... 540
Period of Loans on Road Work..... 555
Organization of City Paving Departments. 571
Reinforcement in Concrete Roads..... 583
Extent of Municipal Control Over Streets. 609

International Union of Cities..... 615

Legal Decisions 609

Lighting, Street
The Maywood, Ill., Street-Lighting System. 559
New White Way in Abilene, Texas..... 567

News and Illustrations..... 623

Parking of Automobiles
Chicago Plans an Underground Garage.... 562
Free Parking Space, Kansas City, Mo.... 588

Publications 617

Recreation
A Pool for Swimming and Skating..... 548
A Plea for Imagination in Playground Design 556
Landscaping, Fencing, Surfacing of Playgrounds 557
Play the Game!..... 589
Popular Sports in Washington Parks.... 590
For Want of a Municipal Playground.... 591
A New Park Swing of Heavier Construction 627

Sewage Disposal
Sewage Treatment Works, Worcester, Mass. 597
Porous Plates for Sanitary Works..... 629

Street Cleaning and Snow Removal
Does Street Flushing Fill Up Catch-Basins? 535
Motorization for Street Cleaning and Refuse Removal, Chicago..... 563
Counties Prevent Blockading of Roads by Snow 577
Creeper Loaders in Municipal Work.... 633

Street Signs for Richmond, Va..... 549

Traffic
School Children and Traffic Officials..... 551
A Friendly Greeting to Motorists..... 551
Deaths from Motor Vehicle Accidents in 1923 590
Abandonment of Plain-Clothes Traffic Officers Predicted 596
Painting Traffic Lines by Machine..... 631

Transportation Should Keep Pace with Civic Changes and Growth..... 568

Waste Collection and Disposal
Dewatering Garbage 533
Saving Money by Baling Metal Refuse.. 633

Water-Supply and Water-Works
Fire-Hose, Water Pressure and Hydrant Spacing 544
Shepaug Tunnel Increases Waterbury's Water-Supply 545
New Water-Supply, Tulsa, Okla..... 553
Laying a Subaqueous Water-Main, Minneapolis 581
Water-Mains Laid by City Forces..... 587
Copper Service Pipe 623

See also Municipal and Civic Publications, page 617

The offices of THE AMERICAN CITY, 443 Fourth Avenue, N. Y., are headquarters for the free distribution of information on equipment for municipal work. If you want catalogs, prices or names of manufacturers, let us help you.

Watch Their Morale, Chief!

Inaction is about the worst possible thing for the morale of your force. Just let the boys go any length of time with no calls and they naturally begin to get stale on the job.

You know the remedies that keep them active and on their toes every minute—practice runs, ladder climbing contests, hose coupling, and so forth.

And when they get out the hose, don't fail to include an inspection. Look over the hose you have on hand and see that it is ready to respond to the alarm as quickly as your men will be. Don't cripple a good fire-fighting force with inferior hose.

Goodrich hose always responds in a crisis. Its perfectly woven jacket insures uniform strength in every foot, and there is an absolute safe-guard against deterioration in its long-lived tube. There is half a century of hose making experience behind it.

THE B. F. GOODRICH RUBBER COMPANY
Akron, Ohio
ESTABLISHED 1870

Goodrich
Fire Hose
"Best in the Long Run"

Van Dorn Gear-Driven Hoists

The Van Dorn "Average Duty" Underbody Hoist. For pay loads up to 7½ tons, a greater margin of safety allowance than the usual hoist rating

The Van Dorn "Heavy Duty" Underbody Hoist. For pay loads up to 9 tons. Powerful and positive in action. The highest quality hoist obtainable.

"We Need Good Hoists!"

Truck Owner—"What's wrong with those we have?"

Truck Foreman—"We can't depend on them."

Ordinary hoists have certain features that often cause serious trouble and delay. Good trucks deserve good hoists.

Van Dorn *Mechanical* Hoists are *good hoists!* They never leak, clog or freeze up in winter because oil is used for lubrication only, not for operation. They are *gear-driven* just like the truck transmission. Put Van Dorn *Mechanical* hoists on *your* trucks. They make *good* trucks *better!* Write for catalog.

THE VAN DORN IRON WORKS CO., Cleveland, Ohio.

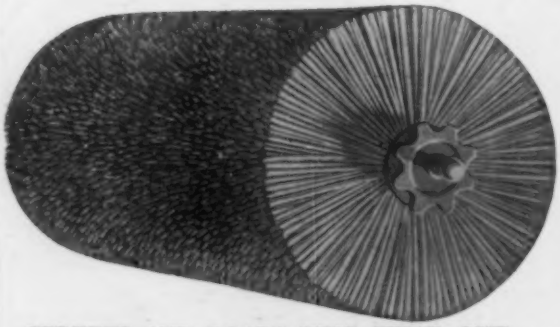
Branches and Service Stations in Principal Cities

Van Dorn

MECHANICAL DUMP TRUCK HOISTS & BODIES

SERVICE --- ECONOMY

With a Saving in Freight Charges



STREETS AND ROADS WILL WEAR OUT—

—SO WILL BRUSHES

With the view of rendering more efficient service to Cities and Towns

THE KENDALLVILLE BROOM & BRUSH CO., Kendallville, Ind.
and their associated organizations
THE LANG BROOM COMPANY Pittsburgh, Penna.
request that all rolls for refills east of Akron, Ohio, be shipped to the Lang Broom Company at Pittsburgh, and west of Akron to the Kendallville Broom and Brush Company, Kendallville, Ind.

Trustworthy brooms and brushes fairly priced for all purposes are offered by both companies.

You Save Freight

HOOVER
COMMERCIAL BODIES

A Hoover Body Will Meet Your Requirements Exactly

Our experience of over a quarter of a century in commercial vehicle building assists you in obtaining the correct equipment for your individual needs.

Bodies are constructed for mounting on any type chassis.

HOOVER BODY CO. YORK, PA.
Eastern Sales Branch, Long Island City, N.Y.

The Russell Super-Mogul

Everything needed for road construction, road maintenance and road repairing—

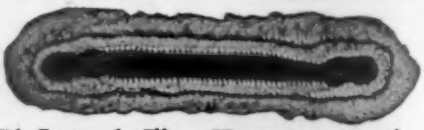
8 Sizes Road Machines—2 Sizes Elevating Graders—

Maintenance Patrol Machines for both Motor and Horse Power, Scarifiers, Road Drags, Drag and Wheel Scrapers, Drag Lines, Gravel Screening, Crushing and Loading Equipment, Steel Beam Bridges, etc.

A very complete catalog of special interest to all road builders—sent free and postpaid.

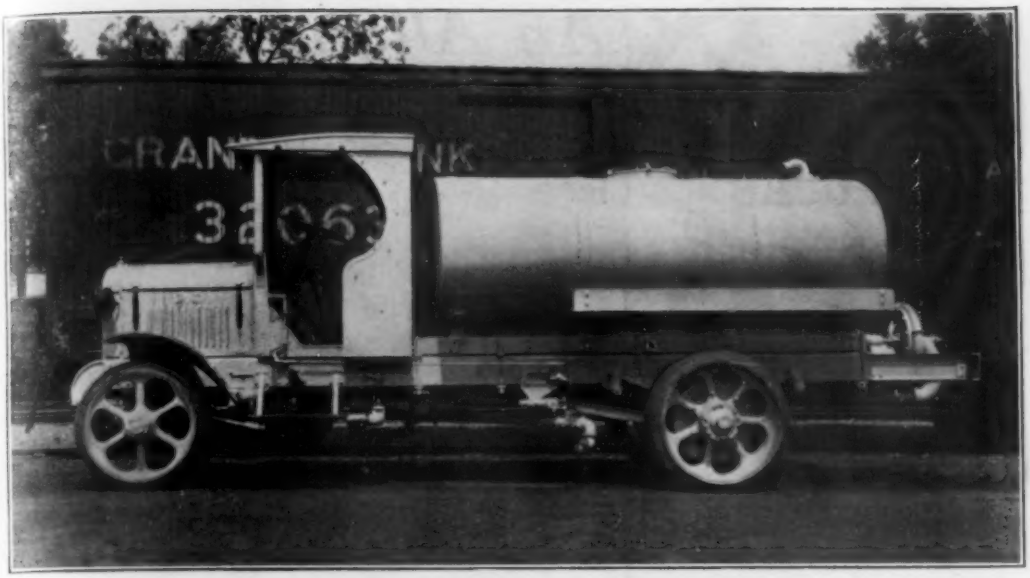
RUSSELL GRADER MANUFACTURING COMPANY
FACTORY AND GENERAL OFFICES
MINNEAPOLIS, MINN.

RUSSELL



Bi-Lateral Fire Hose construction keeps the rubber from cracking or leaking. If you want the best fire hose at the lowest cost per year of service, send for our catalogue.

Bi-Lateral Fire Hose Co.
9 South Clinton St. Chicago, Ill.



Save Money Flushing

Give Your Streets this Efficient New GMC Flusher

This new GMC Single Unit Flusher offers to your street cleaning department new features of flusher efficiency and economy.

One power plant, the truck engine, furnishes the power both for driving the flusher and for driving the flusher pump.

Single power unit flushers are not unusual. But heretofore the pump arrangement has necessitated the use of a long-wheelbase, hard-to-manouver chassis.

Now, GMC engineers have made it possible to use the more desirable, short-wheelbase chassis by installing the pump *on the rear.*

The tank is mounted close to the cab in this new GMC design. Better load balance results. Wear and tear on the chassis is saved. Two sizes are available—1000 gallons or 1500 gallons.

These flushers are products of General Motors, backed by expert service facilities everywhere in the forty-eight states.

Ask for all the details before you decide.

GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
PONTIAC, MICHIGAN

General Motors Trucks

GMC

Clip and Mail

General Motors Truck Co.
Dept. 20 **Pontiac, Mich.**

Send me full details of the GMC Single Unit Flusher.

Name .....

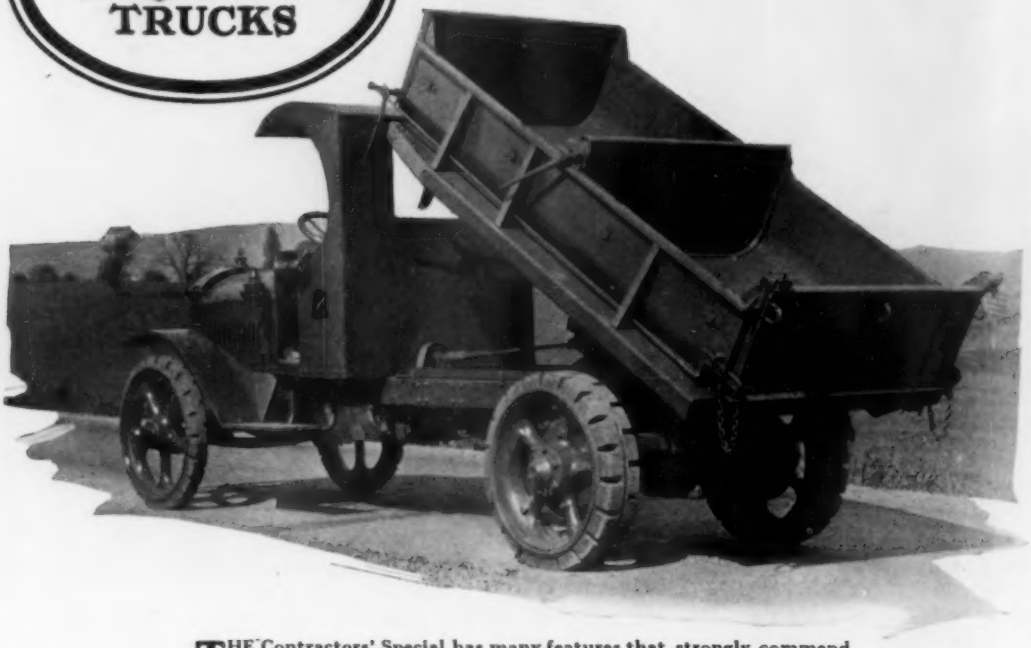
Official Position .....

Address .....

REG. U.S. PAT. OFF.

Mack TRUCKS

An All Purpose Mack Dump Truck



THE Contractors' Special has many features that strongly commend it to experienced road builders, contractors and engineers.

Its demountable cab top, low body sides and underbody type of hoist combine to reduce the overhead clearance to a minimum—a decided advantage where hoppers are low.

The body is slightly wider at the rear than at the front. Where the bottom and sides meet, the edges are rounded, the interior finish is smooth and the angle of the hoists is high, giving a free and easy discharge of either wet or dry materials. The spreader chain equipment regulates the tail gate opening allowing an even distribution when unloading.

Made from No. 7 gauge sheet metal, this body is both welded and riveted together. Steel running boards along both sides of the sub-frame act as an additional reinforcement and body guard. The tail gate is double-acting with manual control. Standard equipment provides one removable swinging partition. Additional partitions furnished and installed at a small extra charge.

With a water level capacity of 72 cu. ft., the use of sufficient removable partitions allows the handling of the following batch loads:

Two 5-bag batches of dry mixture
Three 4-bag " " " "
Four 3-bag " " " "

The chassis and motor are Mack-built throughout. This Contractors' Special embodies Mack strength, Mack endurance and Mack low ton mile costs, the result of twenty-four years of specialization.

Write for detailed description of this or any type of Mack for economical highway transport service. Inspect the Mack exhibit in spaces A 7, 8 and 9 in Coliseum Annex at Sixteenth National Good Roads Show, Chicago, Jan. 5th to 9th inclusive.

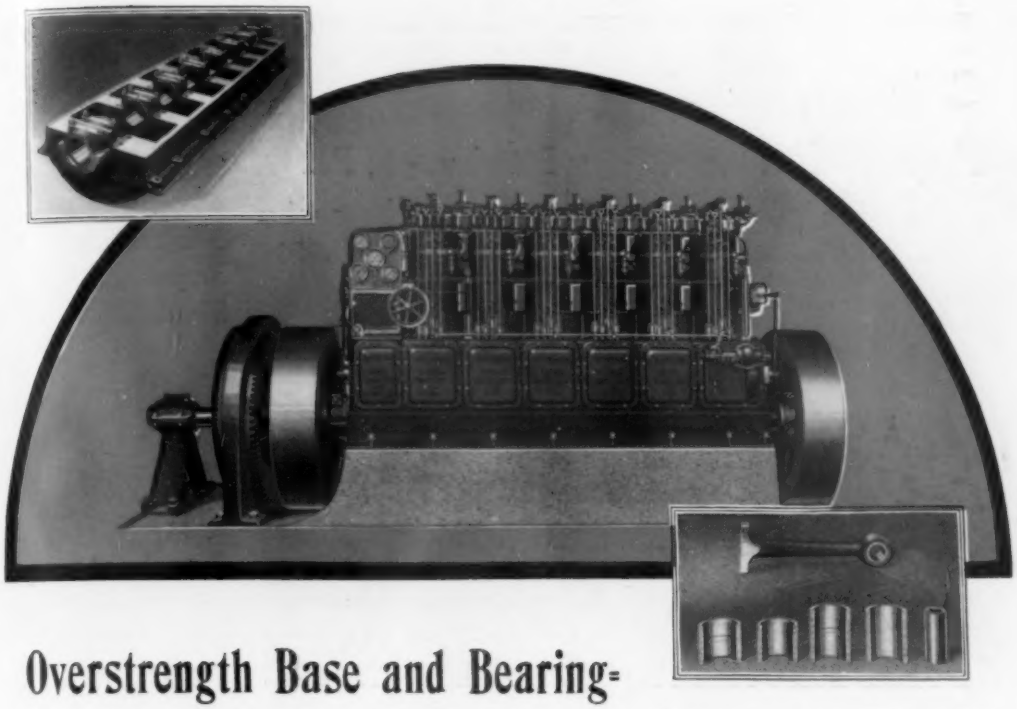
MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 Broadway New York City

Eighty-three direct Mack factory branches operate under the titles of: "Mack Motor Truck Company" and "Mack-International Motor Truck Corporation."

PERFORMANCE COUNTS

THE MACK LINE

Road Tractors
Dump Trucks
Oilers
Gasoline Railroad Equipment
Special Ash and Garbage Truck
Road Sprinklers
Catch Basin Cleaners
Fire Apparatus
Wrecking Trucks
Semi-Trailers
Flushers
Special Farm Trucks
Motor Buses
Armored Trucks



Overstrength Base and Bearing-Shell Add Years of Service to Bessemer Diesels

The base and main bearings are the foundations for long life and continuous service of Bessemer-built Diesel engines.

Bases of Bessemer Diesel Engines are built to form a substantial support for the crankshaft, and are scientifically designed to give the maximum truss, both in cross section as well as in longitudinal directions.

The main bearings between each crank are supported by double walls. The bearings are full shell, lined with the finest non-ferrous metal, hand-scraped to fit the base and lubricated with a continuous pressure force feed lubrication system.

The outer and main bearings are provided with suitable lips and a sling ring is shrunk on the shaft which prevents oil leakage outside of the base. These recesses are drained back to the base to insure ample lubrication at a minimum of loss of lubricating oil. This also permits a cleanliness not possible with ordinary bearing design.

THE BESSEMER GAS ENGINE COMPANY

18 LINCOLN AVENUE GROVE CITY, PA.

BESSEMER

DIESEL ENGINES

Chicago, Illinois
Population over 1,000,000

Pittsburgh, Pa.
Population between 500,000 and 1,000,000

Minneapolis, Minn.
Population between 250,000 and 500,000

FROM THE LARGEST

TEXACO Asphalt is not a "Big City" paving material, nor a "Small Town" paving material. It is the efficient servant of municipalities of *all* sizes.

A review of the list of 1,100 United States cities and towns having TEXACO Asphalt streets proves this. New York, Chicago, Baltimore, Kansas City head that list, and terminating it are scores of municipalities whose reputations have not yet gone beyond the borders of their own States.

There are two conclusions to be drawn from a study of this list of TEXACO municipalities:

In the first place, the representation of cities and towns of every size is strong proof of **the serviceability of TEXACO under all classes of traffic,** from the heavy commercial vehicles of the metropolis to the lighter traffic of the small town.

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

Louisville, Ky.
Population between
100,000 and 250,000

Lansing, Mich.
Population between
50,000 and 100,000

Fort Smith, Ark.
Population between
25,000 and 50,000

Lakeland, Fla.
Population less than
7,500

TO THE SMALLEST

In the second place, the wide distribution of these municipalities throughout the United States emphasizes the **serviceability of TEXACO under all degrees of climatic variation.**

TEXACO

The Texas Company, U.S.A.

ASPHALT SALES DEPARTMENT

17 Battery Place, New York City

New York
Philadelphia
Richmond
Boston
Jacksonville

New Orleans
Chicago
St. Louis
Cleveland

Oklahoma City
Kansas City
Houston
Minneapolis
Dallas

Pennsylvania Golf is the closest cutting mower for putting greens, tennis courts and fine lawns

Pennsylvania Trio is a time- and labor-saver on large areas, golf courses, polo grounds, parks or estates. It cuts an 86-in. swath

Five Pennsylvania Quality Mowers driven by tractor will cut 60 to 80 acres a day.

Golf clubs planning their 1925 budgets will do well to include in them one or more PENNSYLVANIA QUALITY Lawn Mowers. The efficiency of this famous mower will show in the improvement of the turf, and its long life makes it the most economical in the long run.

PENNSYLVANIA QUALITY LAWN MOWERS, either operated by tractor, drawn by horse or pushed by hand, have made wonderful records in the past 50 years for continuous service on golf courses, public parks and large estates.

Let us send you the Pennsylvania Trio Book

Pennsylvania Lawn Mower Works
1615 North 23rd Street, Philadelphia.

SEND TODAY FOR THIS NEW BOOKLET!

Solvay Calcium Chloride has been approved by engineers wherever it has been used, and, is today recognized as a necessary material for concrete curing.
It is for use in all concrete work, and for use in mortar, in setting brick. Its efficiency is not impaired by the weather. The action of Solvay enables brick work and concreting to proceed at exceptionally low temperatures, as it lowers the freezing point of water, at the same time hastening the action.

For **CONCRETE CURING**

use **SOLVAY**

Free Running

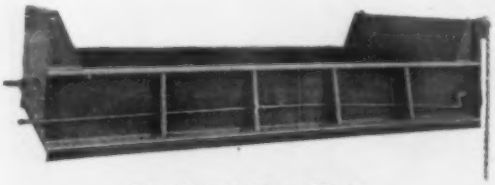
Calcium Chloride

ACCELERATES, HARDENS, FREEZEPROOFS—WATERPROOFS CONCRETE

Shipped in 375 lb. non-returnable drum or easy-to-handle 100 lb. moisture-proof bags from 50 convenient distribution points. Our new booklet No. 1053 "Concrete Summer and Winter" sent free on request.

THE SOLVAY PROCESS CO.

WING & EVANS, Inc., *Sales Department* 40 Rector St., N. Y.



Steel Body Type W-12

WOOD DETROIT

Steel Dump Bodies

"---or equivalent"

When a municipal or state department lets bids for steel dump bodies it is not at all uncommon for them to specify "Wood Steel Dump Bodies or equivalent."

Which goes to show that Wood Dump Bodies as well as Wood Hydraulic Hoists are generally considered as being the standard by which other bodies and hoists are measured.

Whatever your requirements may be, there is a standard Wood Steel Dump Body designed especially to meet them.

May we send you our latest Catalog?

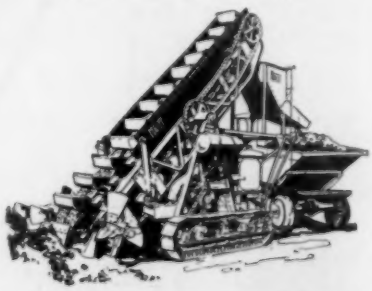
Wood Hydraulic Hoist and Body Company

World's Largest Makers of Hydraulic Hoists and Steel Dump Bodies

7936 Riopelle Street **Detroit, Michigan**

A truck flut without a Haiss truck Loader is losing 10 to 25 trips per day

Use One for Snow Removal



Read our Catalog 523—Sent on request.

The Geo. Haiss Manufacturing Co., Inc.
143rd St. and Rider Ave., New York

Every Water Dept. Should Have This

CHAUSSE Portable Kerosene Torches are being successfully used by water departments, contractors and railroads all over the country for thawing pipes, melting babbit, drying sand and wherever intense heat is required. Not affected by rain or wind. Can be burned in any position. Safe and economical. 3-gallon and 2-quart sizes. Don't wait for cold weather—be PREPARED. Order NOW.

Circular on Request

Chausse Oil Burner Company **Elkhart, Indiana**

Kelly Kats will stand any service test

The real test of a truck is the service it gives in actual use. How do the tires you have been using measure up to this test?

Have they given ample traction at all times?

Have they cushioned your truck satisfactorily?

Have they stood up under severe punishment?

Have they delivered long, economical mileage?

If you have been using Kelly Kats your answer to each of these questions will be "yes." Kelly Kats combine *all* these qualities to a degree not equalled in any other type of tire and they will successfully stand this or any other service test to which you may wish to put them.

There are no Caterpillar tires but Kelly Kats

KELLY-SPRINGFIELD TIRE COMPANY

250 West 57th Street
New York, N. Y.

KELLY KATS
TRADE MARK REG.
THE TIRES WITH NINE LIVES

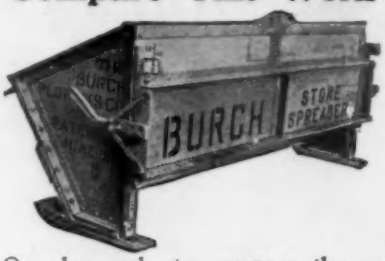
Kelly Kats have been tremendously successful in the construction field because they possess all the qualities tires must have to do this kind of work and are handicapped by none of the faults which many other types of tires have.

The King of the Black-Tops Says:—

"As the pages of life's book are turned in 1925, may you find on each one, something pleasant to remember—and may you write on each, some record that will help make the year,

'Best By Every Test'."

Compare This Work



One has only to compare the work done by a gang of laborers with the work done by the

BURCH SPREADER

to see the great advantages of putting your road material on the bed by this machine. In time, labor costs, thoroughness, evenness and economy of material, the machine wins. It pays for itself in a mile of highway. With the

BURCH UNLOADER

material is taken from the cars and spread with quickness, thoroughness and economy that appeal to every contractor.

Let us tell you the results in dollars as well as time.

The Burch Plow Works

Dept. B-1 **CRESTLINE, OHIO**

AMERICAN STEEL & WIRE COMPANY

American Triangle Mesh and Electric Weld Reinforcing Fabrics

Wire fabric reinforcement for concrete roads ensures permanence

There is no form of road that is as economical, enduring and efficient as a concrete road. And when it is reinforced with steel wire fabric it is practically good for all time if the foundation and mixture is right.

Send for our new Road Building Book.

Chicago New York Boston Pittsburgh Cleveland Denver San Francisco

Concrete Curing Problems Solved

The actual making of concrete begins when water is added to the dry ingredients in the mix. The physical and chemical action starts immediately and must continue long after the concrete is poured to secure tough, enduring pavements.

The curing process is a means to maintain the required supply of moisture until the action within the cement is finished. Moisture enables the stone making process to work itself to completion.

The first methods of getting and holding moisture were awkward. They involved the work of men with pipelines, pumps and hose. Grading, scraping, banking and earth removal were costly and time consuming.

The modern method removes all these obstacles. It does the same thing as the old-fashioned, awkward, costly methods.

One man can quickly apply Dowflake to the full day's mixer run. Dowflake is a clean, odorless chemical Salt. As soon as spread on the pavement it begins drawing moisture from the air. It absorbs several times its weight and holds moisture in contact with the pavement. It cures completely and efficiently. Though it cures in a fraction of the usual time it does not affect the ultimate strength. State Departments have tested and approved. The antiquated curing methods cannot be compared with the use of Dowflake as a curing agent. Dowflake's accelerating and anti-freeze properties make it invaluable for cold weather concrete work. Write for our book—"How To Cure Concrete."

The Dow Chemical Company

Midland, - - - - Mich.

Branch Sales Offices

90 West Street, New York City
Second and Madison Sts., Saint Louis

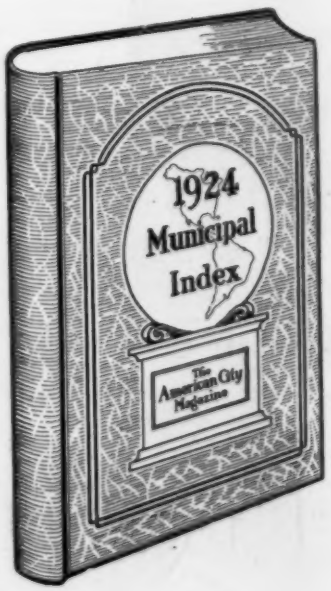
What Is Back of the Municipal Index

The basic thought in back of THE MUNICIPAL INDEX was to render an additional service to the field covered by THE AMERICAN CITY MAGAZINE. Comprehensive data pertaining to the efficient administration of the various departments of cities, towns, villages and counties is presented in a very concise manner. In addition to this, detailed descriptions of equipment and material offered by manufacturers are incorporated in this handsomely bound book of over 400 pages.

Out of thousands of enthusiastic acknowledgments from city, town and county officials, the following letter is fairly typical:

"THE MUNICIPAL INDEX will be of untold benefit in connection with carrying on our improvement work, as well as in the purchase of supplies and equipment."

If you have not already seen a copy of the MUNICIPAL INDEX please let us know and we will send you a copy on approval.



Published by

The American City Magazine

443 Fourth Avenue, New York

35 years?
30 years?
25 years?
20 years?

The gamble in buying a brick pavement is never *"Will it last?"* but only "How *long* will it last?"

Napoleon laid brick pavements in Holland, and there are brick pavements in use there today which are more than one hundred years old.

The United States has scores of brick pavements that are more than thirty years old. Some of these should give a half-century of service, in spite of modern traffic, before the original brick is replaced.

Can you name a pavement in your vicinity, other than brick, which at a comparable cost has given you even twenty years of service?

Paving bonds pay for paving but taxes pay for paving bonds. See to it that your community buys paving wisely and buys vitrified brick, ***the pavement that outlasts the bonds.***

VITRIFIED **Brick** PAVEMENTS

National Paving Brick Manufacturers Association
Engineers Building · Cleveland, Ohio

OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO

Dust!

Can Be Conquered with

CARBONDALE CALCIUM CHLORIDE

LEARN HOW

We will gladly send you two fully explanatory pamphlets on the subject at your request.

Main Office

CARBONDALE CALCIUM CO.

CARBONDALE, PA.

Branch Offices:
Chicago, New York, Philadelphia, Pittsburgh, Buffalo, New Orleans, Baltimore, Washington, D. C.

HUBER ROAD TOOLS

MAINTAINERS - ROLLERS

The Huber Four Cylinder Gasoline Roller starts easily, has surplus power and convenient to handle. Air controlled scarifier folds under when not in use.

The Huber Steam Roller has been standard equipment with road builders for many years. Always dependable. The Huber One-Man Road Maintainer is economical and the four cylinders furnish excess power. Has weight enough to hold blade down when making heavy cut and pulls a detached grader when necessary.

Write for illustrated folders on any Huber Road Tool.

THE HUBER MFG. CO.

102 Center Street, Marion, Ohio

FOR HANDLING CRUSHED STONE or SAND and GRAVEL

From cars to trucks the RELIANCE PORTABLE CAR UNLOADER will save more than its cost in one season.

Catalog and Price List on Request.

UNIVERSAL ROAD MACHINERY CO.

KINGSTON, N. Y.

New York Office, 114 Liberty St. Boston Office, 141 Milk St.

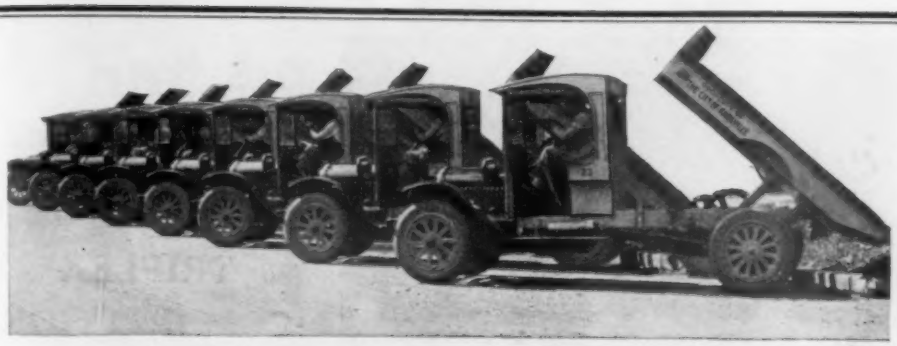
Sterling Traffic Sirens Electric

These Signals make dangerous street intersections safe for Traffic and Motor Fire Apparatus. Can be used singly or in batteries.

Write for Bulletin No. 604.

THE INTER-STATE MACHINE PRODUCTS CO., INC.

53 Allen St. Rochester, N. Y.



Mounted on Model 15 White Trucks

Eight Heil Dumps for Knoxville, Tenn.

Knoxville has eight of these hand hoist dump jobs for garbage collection service. Sturdy, dependable, and low priced equipment. Bodies mounted with a special type Heil Underneath Hand Hoist. Can be covered with tarpaulins. This equipment cut garbage collection labor cost almost 100 per cent.

Heil also manufactures Garbage Dump Bodies for mounting with Heil Hydro Hoist on larger trucks. Ask about Heil insulated Asphalt Bodies, Sprinkler Tanks, Ash and Rubbish Bodies, Sand and Gravel Bodies. Write Today for Literature and Prices.

THE HEIL CO.

1242-60 26th Ave. **Milwaukee, Wis.**

One of Our Twenty-five Distributors is Near You

BUFFALO-SPRINGFIELD ROLLERS

All Types and Sizes

With or without Scarifier attachment.

Helps you finish the job on time.

Send for catalog A for complete information.

The Buffalo Springfield Roller Co.
Springfield, Ohio.

THE

TRADE MARK Kinney REG. U.S. PAT. OFF.

TRIPLEX COMBINATION

STREET FLUSHER

A single power unit for driving truck and supplying pressure for flushing, sprinkling and oiling.

No extra gasoline engine or separate power plant required for supplying pump pressure.

STREET SPRINKLER AND ROAD OILER

The change from water sprinkling or flushing to oil spraying is made instantaneously.

Unequalled for efficiency and low cost of operation.

Write us today for full Details

KINNEY MANUFACTURING COMPANY

BOSTON, MASS.

NEW YORK CHICAGO SAN FRANCISCO KANSAS CITY PHILADELPHIA TAMPICO HOUSTON

What Constitutes a GOOD Heater?

The first and most important requirement of a good tar and asphalt heater is heating efficiency;—ability to melt and heat in the quickest possible time, obviating unnecessary time delays and idle labor.

—Littleford Tar and Asphalt Heaters will melt and heat tar and asphalt in one-third the time required with ordinary heaters.

Sturdy construction is vital to heater life and service. It must withstand the hardest usage.

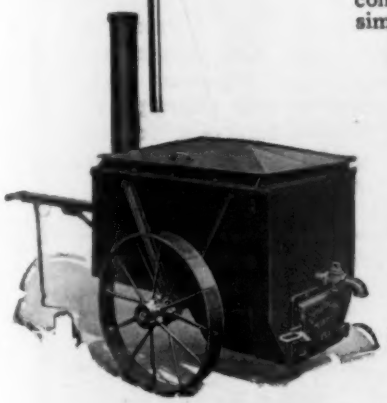
—Littleford Tar and Asphalt Heaters because of their rugged construction are gluttons for punishment.

Heater economy depends to a great extent upon the length of service a heater gives and the number of repairs and replacements necessary to keep it in condition.

—Littleford Tar and Asphalt Heaters in many instances have seen twelve and fourteen years of continuous service. Their upkeep for repairs and replacements is almost negligible.

Convenience in handling, simplicity of operation are essentials of a good heater.

—Littleford Tar and Asphalt Heaters are designed and constructed to permit ease of handling,—they can be conveniently moved from one job to another and are simple in operation.



All are reasons for the tremendous preference for Littleford Tar and Asphalt Heaters. A line from you will bring our catalogue. Write for it.

LITTLEFORD BROS.

500 East Pearl Street, Cincinnati, Ohio

CLEAN YOUR CITY WITH AN AUSTIN MOTOR SWEEPER

Clean streets are an asset to any community. They react favorably on citizens and strangers alike, and are one of the best and most tangible indications of a progressive administration.

The street cleaning problem is one that can never be solved in the sense of ceasing further to exist, since dirt and filth will always continue to be deposited on our city streets; but Austin Motor Sweepers come closer to solving it than anything else.

Let us show you how they will make your resolution for "A Clean City" come true.

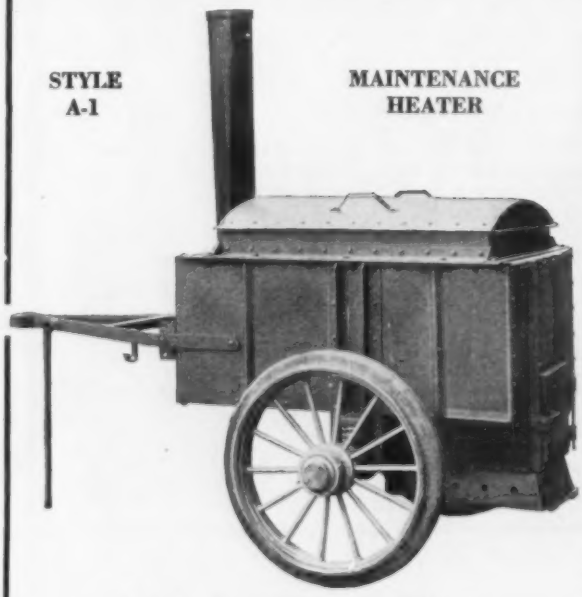
THE AUSTIN-WESTERN ROAD MACHINERY CO.

Factories and Home Office: CHICAGO

Branches in 22 Cities

STYLE A-1

MAINTENANCE HEATER



Made in any capacity from 65 to 255 gallons. Equipped with springs, ash pan and Connery's Patented Ribs. Hyatt Roller Bearings and rubber tired wheels furnished if desired.

Connery's Tar and Asphalt Heaters are equipped with the latest improvements, such as Rubber Tired Wheels, Hyatt Roller Bearings, Springs, Oil Burners, etc. Strength and endurance to withstand strenuous daily duty without interruption is possible because of Connery's special features and modern improvements.

Send for our latest catalog showing the new styles.

CONNERY & COMPANY, Inc.

4000 N. Second Street,

Philadelphia, Pa.

Today at more than 400 points in the United States, *Childs* Motor Apparatus is meeting every requirement of municipal fire protection. Above is shown one of the two *Childs* Triple Combination Pumper, Chemical Engine and Hose Car equipments in service at Seneca Falls, N. Y.

Why 400 municipalities prefer *Childs* equipment

Here are several definite reasons why fire departments and municipal officials of more than 400 cities and towns use *Childs* Motorized Equipment:

1. The most elaborate apparatus is of little use if repair difficulties keep it in the engine-house. *Childs* equipments are free from this handicap. Built to fit any commercial truck chassis, they can always be kept in perfect running order by a nearby service station.

2. *Childs* equipments carry not only the usual accessories, but also the *Foamite* extinguisher, the most effective known device for extinguishing incipient fires of oil, gasoline, paint, grease, etc.

3. *Childs* equipments are the finished, dependable output of a company with 28 years' experience in the municipal fire protection field. Service records prove that the old *Childs* slogan, "Made on honor, sold on merit," means exactly what it says.

4. Where municipal pride in *appearance* is a factor, the trim, handsome finish of any *Childs* unit is another point in its favor.

* * *

If your 1925 budget makes provision for additional fire protection, get all the facts about *Childs* Motorized Equipment.

Write for complete new illustrated catalogue. It is free. On request we will also put your name on the mailing list for the "Industrial Fire Chief," a publication of real interest to all firefighters.

Foamite-Childs Corporation

Fire Protection Engineers and Manufacturers

85 Turner Street, Utica, N. Y.

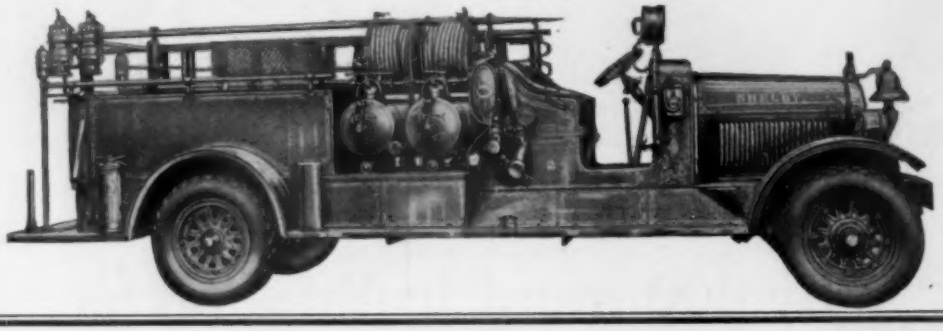
Sales and Engineering Representatives throughout the United States

THE "DELUGE" *Master Fire Fighter* is built on a selected chassis, powered with a 75-Horse motor—capable of 350 to 450 gallons of water per minute.

Write for full details on this latest addition to our line of "DELUGE" Apparatus.

Sales Territory open to reliable agents interested in our fast growing organization.

THE PROSPECT FIRE ENGINE CO.
PROSPECT, OHIO



FABRIC FIRE HOSE COMPANY

127 DUANE STREET
NEW YORK, N. Y.

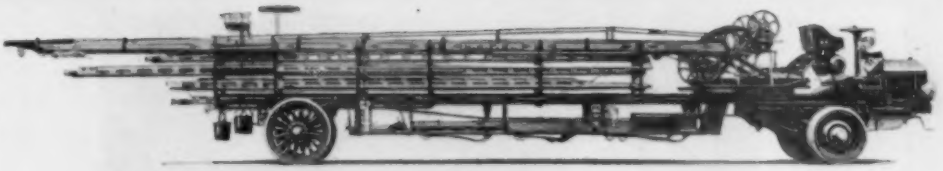
FACTORY: **SANDY HOOK, CONN.**

Patentees and Sole Manufacturers since 1880

WAX AND PARA GUM TREATED COTTON
RUBBER LINED FIRE HOSE

BRANCH OFFICES:

Chicago, Ill.
Atlanta, Ga.
Columbus, Ohio
Minneapolis, Minn.
Dallas, Texas
Portland, Ore.
San Francisco, Cal.
Baltimore, Md.
Boston, Mass.
Binghamton, N. Y.
Pittsburgh, Pa.
Bloomfield, N. J.
Montreal, Canada



The Performance of

American-LaFrance Type 31 Aerial Truck

is Conspicuous at Every Fire where it is present.

Many fire departments have expressed their amazement at the ease with which the American LaFrance Type 31 Aerial Truck can be handled at high speeds. It is due to the unusually low center of gravity for a truck of its size. This point assures safety and ease of handling.

The ladders are made from especially selected stock, thoroughly seasoned to preserve the strength of the wood.

Let us send you data on the Type 31.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

BRANCHES
NEW YORK
BOSTON
ATLANTA
PITTSBURGH
CHICAGO
DALLAS

ELMIRA, N. Y.
CANADIAN FACTORY
TORONTO, ONT

BRANCHES
DENVER
MINNEAPOLIS
LOS ANGELES
SAN FRANCISCO
WASHINGTON
PORTLAND

On a Thousand Fire Lines—

Whenever the fire siren sounds, whether it be a basement blaze or a high pressure call, you'll find Eureka Fire Hose on the job, inside the fire lines from coast to coast.

There's no place for inferior hose in fire fighting. Life and property depend upon the consistent performance of every bit of equipment.

Forty-nine years of never-failing service have earned for Paragon and the other famous brands of Eureka a high place in the regard of experienced fire fighters.

United States Rubber Company

EUREKA FIRE HOSE DEPARTMENT

50 Church Street New York

BRANCHES:

Atlanta Chicago Dallas Kansas City Minneapolis Seattle
Boston Columbus Detroit Los Angeles Philadelphia Syracuse

Trade Mark

Service— when fire alarm headquarters *is destroyed*

A score or more cities have seen their fire alarm headquarters destroyed by fire during the past few years. Naturally they turned to The Gamewell Company for emergency apparatus and in every case we have been able to help.

Each city required special treatment. Sometimes used apparatus served the purpose temporarily. Occasionally pieces of new apparatus were available to provide protection until a new system could be built and housed in a fireproof building.

You may not need such service frequently but you do need it badly if the emergency arises. This is an emergency insurance which you get when you specify Gamewell apparatus.

THE GAMEWELL COMPANY

Newton Upper Falls, Mass.

A BOX A BLOCK

The People's Telephone

The telephone knows no favorites. It does the bidding of the country store and of the city bank. It is found in the ranch house kitchen and in the drawing-room of the city mansion. Its wires penetrate the northern forest, stretch across the prairie, are tunneled under city streets.

The telephone knows no favorites. Its service to all the people is of the same high standard—the Bell System standard. Twenty-four hours a day it carries the voices of all. For the benefit of all, the long-distance circuits are kept in tune. Numberless discoveries and improvements developed by the Bell System have made the telephone more useful for all the people. In America, all can afford the telephone, for Bell System service is the cheapest, as well as the best, in the world.

The telephone knows no favorites. It is not owned in any one locality or by any particular group of men. It is owned by 350,000 stockholders, who represent a cross-section of the thrift of the whole country. The owners of the telephone are those it serves.

In America to-day the 15,000,000 telephones of the Bell System contribute to the security, happiness and efficiency of all the people.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

When writing to Advertisers please mention THE AMERICAN CITY—Thank you.

Kyrock

the Original and Standard Kentucky Rock Asphalt

The remarkable development of Kentucky Rock Asphalt in the last few years has been due to the uniform high quality of the rock asphalt produced by this company and its care in seeing that KYROCK pavements are properly constructed.

There are many deposits of rock asphalt in Kentucky but not all of them are suitable for pavements. KYROCK is the original rock asphalt coming from the same deposits as the material used in the old rock asphalt roads and streets which have been thoroughly tested by time and traffic.

KYROCK is laboratory tested at every stage of its production to assure a uniform mixture of bitumen and sand. No bitumen or other materials are added.

A competent staff of engineers, throughly experienced in rock asphalt construction, keeps in constant touch with all KYROCK work, co-operating with the local engineer and contractor to the end that all KYROCK pavements may be satisfactory.

KYROCK is laid cold on any standard base sufficient to carry the traffic. It is used extensively for surfacing old macadam, brick, asphalt, concrete and gravel roadways. Shovels, rakes and roller are the only equipment needed

In planning their 1925 paving program, engineers and officials should consider KYROCK. Specifications for KYROCK construction will be furnished on request.

Engineers who are planning rock asphalt construction should insist on KYROCK. It insures high quality, uniformity, service and the responsibility of the oldest and largest producers of Kentucky Rock Asphalt. Write for booklet A.C.

Kentucky Rock Asphalt Co.

Incorporated

711-718 Marion E. Taylor Bldg. Louisville, Ky.

Canadian Office: Canada Permanent Bldg., Toronto

Jaeger
A MIX A MINUTE

The Standard Mixer of America

For the "City Job"

BUILDING roads—repairing them—laying sidewalks — patching worn-out streets—**for every piece of city concrete work there's a Jaeger mixer especially adapted to the job.**

The costs for road and street making and maintenance have been reduced to a minimum in the hundreds of cities using this famous "MIX A MINUTE" mixer. More speed, less labor, increased profits—that's the Jaeger story. Write for full facts on this standard line of mixers.

The Jaeger Machine Company
215 Dublin Ave., Columbus, Ohio

Waterous
Dependable

WATEROUS --- REO
Pumper-Chemical-Hose Car

300 Gallon Pump
40 Gallon Chemical
1000-ft. Hose Box
Complete Equipment
UNDERWRITERS ACCEPTANCE GUARANTEED
Send for Literature

WATEROUS FIRE ENGINE WORKS
INCORPORATED
ST. PAUL, MINN.
Agencies in principal cities

Waterous
Dependable

POPULAR

Movie stars become popular because of their ability to please others. Likewise Monarch Industrial Tractors have earned their present popularity through their ability to please their owners.

MONARCH TRACTORS, INC.
Watertown, Wis., U. S. A.

Builders of
The Crawler without Track Trouble.

Monarch
INDUSTRIAL
THE MOST DEPENDABLE CRAWLER TRACTORS

Hotel
Belleclaire

UNIQUE—

in the sincerity of cordial service, in the comfortable spaciousness of sleeping and living rooms, in the niceties of good living. The Belleclaire makes friends of its guests whether they honor us with a stay of a day, a month or a year.

Suites with bath $1600 *a year and up.*
Room and bath $4 *a day and up.*

Write for literature and rates, or phone Endicott 7700.

BROADWAY AT 77TH ST.
NEW YORK

Over 4000 Issues

of Bonds aggregating $615,000,000 have been prepared and certified by this Company for upwards of 750 cities, towns and districts.

The service which we offer in this connection relieves Municipal Officials of much responsibility and detail, and acts as a safeguard against forgery, over-issue and other frauds.

The Company is the officially designated depository of the Investment Bankers' Association of America for legal papers and opinions regarding municipal issues.

Copy of **"Municipal and Corporation Bonds"** *sent upon request.*

UNITED STATES MORTGAGE & TRUST COMPANY

CAPITAL, SURPLUS & UNDIVIDED PROFITS, OVER $7,350,000

New York

Complete Banking and Trust Service

KOLB SECTIONAL SCHOOLHOUSES

Are substantially constructed of the best materials and with the high standard of Kolb workmanship. Made in all sizes, one, two, three and four rooms. Well lighted and ventilated. Quick deliveries. Kolb buildings do not have the appearance of a sectional structure because of design.

The Most Economical Form of Building Construction

Buildings for Every Municipal Purpose—Voting Houses, Recreation Buildings, Churches, Storage Buildings, etc.

KOLB BUILDING CO., INC. - 250 W. 57 STREET, N. Y.

Established 1910

SINCE 1867

COLDWELL

COLDWELL LAWN MOWER CO., NEWBURGH, N. Y.

Coldwell Model "L"

MOTOR

Lawn Mower and Roller

is a thoroughly flexible, dependable and economical machine which mows and rolls simultaneously six acres of grass a day on one gallon of gasoline.

Equipped with the
NEW DETACHABLE GANG UNITS

the cutting width of the Model "L" is more than doubled, greatly increasing its capacity for cutting large, open stretches. These gang units are made so that they can be attached to all Model "L" Motor Lawn Mowers now in service. Complete information will be sent upon request.

DEPENDABLE

Lawn Mowers

"Hand, Horse, Motor and Gang"

796 FEET ABOVE BROADWAY

AN AHRENS-FOX RECORD

Inside the Fire Lines– Ahrens-Fox Piston Pumpers are known as the Hard Hitting Pinch Hitters.

ASK THOSE WHO KNOW

THE AHRENS-FOX FIRE ENGINE CO.

Cincinnati, Ohio

Welcome to New York and the Alamac

71 ST STREET AND BROADWAY

A masterpiece of modern hotel creation. Most convenient, yet quiet. A revelation in hospitality and service, offering many innovations including Servidors, taxis, etc.

Unique Congo Room—Medieval Grille and Blue Room Restaurants.

New York's latest hotel achievement

LATZ OWNERSHIP—MANAGEMENT

Nurseries and Seedsmen

ANDORRA

Ornamentals exclusively, distinctive in quality and variety, for street, park and all civic planting
We cater to the most discriminating trade.

Andorra Nurseries, Inc
Chestnut Hill, Pa.

Have you seen ANDORRA?

SHADE TREES *for* CITY PLANTING

Meehan Trees have been planted from Coast to Coast and from Canada to Mexico for upwards of half a century.

We grow Ornamental Trees, Shrubs and Evergreens. 225 acres. Before placing your order for nursery stock, secure our Wholesale Catalogue.

THOMAS B. MEEHAN CO.
Wholesale Nurserymen
DRESHER, PA.

The Exquisite

HARDY AMERICAN AZALEAS

make permanent plantings and do not die out as do mollis and other exotic sorts.

Flame Azalea, A. calendulacea
Sweet Azalea, Arborescens
Swamp Azalea, A. viscosa
Pinkshell Azalea, A. vaseyi

All these in strong clumps, heavily budded.
Also the finest Broadleaf Evergreens and Conifers.

HARLAN P. KELSEY, OWNER
Boxford-Highlands Nursery
SALEM, MASSACHUSETTS

General Nursery

1000 Acres . . . 70th Year
Ornamental Trees, Shrubs and Roses our specialties . . Pleased to quote on car lots or less . . Excellent shipping facilities

The Storrs & Harrison Company
Box K . . Painesville, Ohio

BOBBINK & ATKINS

Ask for Catalog

ROSES
EVERGREENS
RHODODENDRONS
TREES AND SHRUBS
OLD-FASHIONED FLOWERS
FRUIT TREES AND BUSHES

Visit Nursery

RUTHERFORD NEW JERSEY

NURSERY STOCK

Ornamental Trees For Street and Lawn. Shrubs, Roses, Evergreens, and Perennials.

Special prices on large quantities.

Send for Catalog and Price List

W. & T. SMITH COMPANY **Geneva, N. Y.**

Established 1887 By J. H. H. Boyd

ORNAMENTAL SHRUBS AND FOREST TREE SEEDLINGS

We are growing and offer for sale such stock as American Beech, Cornus Florida, Tulip Poplar Carolina Poplar, Black and Japan Walnuts, Butternuts, River Birch, etc. Shrubs: Althea's Barberry Thumbergii, Deutzia's, Forsythia's, Privett's, Amoor River, California and Ibota; Spirea Van Houttii, etc.

Write us for fall catalogue and prices

FOREST NURSERY COMPANY

McMinnville BOYD BROTHERS Tennessee

Hardy Northern Grown Ornamentals

Properly packed for shipment arrive in good condition and grow better. We are growers of the largest assortment of Ornamental Stock in Michigan.

Special prices to park and cemetery superintendents and other buyers for municipal planting. Send your list for quotations. Write for our catalog.

PONTIAC NURSERIES

25 Parsons Street,

DETROIT, MICHIGAN

BURPEE'S ANNUAL

The Leading American Seed Catalog

Burpee's Annual is a complete garden guide full of valuable information about the best vegetables and flowers.

Write for a free copy of Burpee's Annual today.

W. ATLEE BURPEE CO.

Seed Growers Philadelphia

Framingham Nurseries

Ornamental trees, shrubs and evergreens for street and park planting.

FRAMINGHAM—MASS.

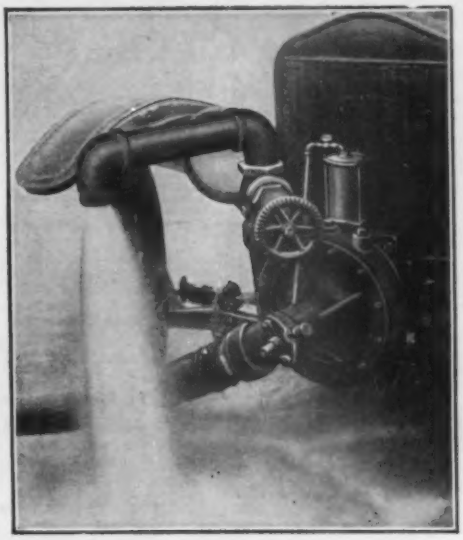
Deciduous and Evergreen
TREES and SHRUBS
For Parks and Roadside Planting.
Roses and Hardy Plants
Our Price List is Yours for the Asking
ADDRESS CATALOG DEPARTMENT
AMERICAN NURSERY CO.
70 East 45th St., New York

SHADE TREES—EVERGREENS
MAPLES—Sugar and Norway.
CATALPA—Bungei.
SYCAMORE—European.
OAK—Pin and Red.
SPRUCE—Norway, 4 to 7 feet.
ARBOR VITAE—American, 4 to 7 feet.
THE COLE NURSERY CO.
PAINESVILLE, OHIO

Ornamental Trees, Shrubs, and Hardy Perennials
A complete stock.
Quality unexcelled.
Send for price list.
HENRY KOHANKIE & SON
Painesville, Ohio

Did You See Advertising PAGES 4-6?

TURN TO THEM NOW!
and check off the literature desired.
There is no charge.



Serving with Satisfaction
The BARTON Portable Pumper
Equipped with the Automatic Vacuum Primer is serving in many capacities with entire satisfaction to owners everywhere. It's the ideal pumping equipment for you. *Send for Descriptive folder.*
AMERICAN STEAM PUMP CO.
BATTLE CREEK, MICHIGAN

BUTLER IMPROVED STREET CANS

are sanitary, artistic and serviceable.
The refuse thrown into the Butler trash can is out of sight. Once in, it stays in until taken out.
Write for latest literature.
The Butler Mfg. Co.
St. Anthony Fall Sta.,
Minneapolis, Minn.

GEOPHONE
For detection of sound
Scientific — Sensitive — Practical
For Information Address
Distributors
Empire Electric and Water Co., Inc.
452 Lexington Ave., New York, N. Y.

DIRECTORY OF CONSULTING ENGINEERS, LANDSCAPE ARCHITECTS ETC

EXPERT ADVICE IS A REAL ECONOMY

The consultants whose cards appear on the following pages are listed below by States.

Robert L. Totten, Birmingham, Ala.
J. Rowland Bibbins, Washington, D. C.
Black, McKenney & Stewart, Washington, D. C.
George Burnap, Washington, D. C.
P. H. Norcross, Atlanta, Ga.
Ernest Whitehard, Dawson, Ga.
William H. Allen, Chicago, Ill.
Alvord, Burdick & Howson, Chicago, Ill.
American Park Builders, Chicago, Ill.
W. H. Allen, Chicago, Ill.
Louis S. Cole, Chicago, Ill.
Jacob L. Crane, Jr., Chicago, Ill.
J. L. Jacobs & Company, Chicago, Ill.
Kelker Deleuw & Co , Chicago, Ill.
Langford & Moreau, Chicago, Ill.
Marr, Green & Company, Chicago, Ill
Maury & Gordon, Chicago, Ill.
Pearse, Greeley & Hansen, Chicago, Ill.
Randolph-Perkins Co., Chicago, Ill.
Edgar A. Rossiter Company, Chicago, Ill.
Charles Brossman, Indianapolis, Ind.
Currie Engineering Co., Webster City, Ia.
Sheffield A. Arnold, Boston. Mass.
Fay, Spofford & Thorndike, Boston, Mass.
Metcalf & Eddy, Boston, Mass.
Weston & Sampson, Boston, Mass.
Arthur H. Blanchard, Ann Arbor, Mich.
Gardner S. Williams, Ann Arbor, Mich.
Bragg Engineering Company, Detroit, Mich.
Russell A. Murdock, Detroit, Mich.
Chas. L. Pillsbury Co., Minneapolis.
Delos F. Wilcox, Grand Rapids, Mich.
E. T. Archer & Company, Kansas City, Mo.
Black & Veatch, Kansas City, Mo.
Burns & McDonnell, Kansas City, Mo.
C. E. Jacoby Eng. Co., Kansas City, Mo.
Arthur L. Mullegren, Kansas City, Mo.
C. E. Smith & Co., St. Louis, Mo.
Conard & Busby, Burlington, N. J.
Ethelbert E. Furlong, Newark, N. J.
F. A. Dunham, Plainfield, N. J.
American Public Utilities Bureau, New York, N. Y.
Banks & Craig, New York, N. Y.
The Beeler Organisation, New York, N. Y.
Thomas F. Bowe, New York, N. Y.
City Wastes Disposal Co., New York N. Y.
H. B. Cleveland, New York
Waldo S. Coulter, New York, N. Y.
Fowler Engineering Corp., New York City
Fuller & McClintock, New York, N. Y.
A. E. Hansen, New York, N. Y.
James C. Harding, New York, N. Y.
Hazen & Whipple, New York, N. Y.
J. Wallace Higgins, New York, N. Y.
Hill, Nicholas S., New York, N. Y.
George A. Johnson Co., New York, N. Y.
Cornelius S. Loder & Associates, New York, N. Y.
Clarence D. Pollock, New York, N. Y.
Alexander Potter, New York, N. Y.
Clyde Potts, New York, N. Y.
James F. Sanborn & C. L. Bogert, N. Y. C.
Henry W. Taylor, New York, N. Y
Technical Advisory Corp., N. Y. C.
Universal Audit Company, New York, N. Y
Thomas H. Wiggins, New York, N. Y.
Brooks & Dean, Poughkeepsie, N. Y.
Hopkins & Field, Rochester, N. Y.
James M. Caird, Troy, N. Y.
Gilbert C. White, Durham, N. C.
B. Ashburton Tripp, Cleveland, Ohio
Geo. B. Gascoigne, Cleveland, Ohio
R. Hasselman, Cleveland, Ohio
The Watson Co., Cleveland, Ohio
Jones & Carr Co., Cleveland, Ohio
Robert H. Whitten, Cleveland, Ohio
The Jennings-Lawrence Co., Columbus, Ohio
Boulay-Harrison Co., Toledo, Ohio
R. H. Randall & Co., Toledo, Ohio
Holway Engineering Co., Tulsa, Okla.
Allentown Testing Laboratories, Allentown, Pa.
Avery & Lamb, Harrisburgh, Pa.
Albright & Mebus, Philadelphia, Pa.
J. W. Ledoux, Philadelphia, Pa.
Scofield Engineering Co., Philadelphia, Pa.
J. N. Chester Engineers, Pittsburgh, Pa.
Morris Knowles Pittsburgh
F. B. Leopold, Pittsburgh, Pa.
Elrod Engineering Co., Dallas, Tex.
J. G. Lawrence & Co., Memphis, Tenn.
Edward Worthen, Richmond, Va.

SURVEYS
FRANCHISES
CONTRACTS
ARBITRATION
TAXATION
LEGISLATION
OWNERSHIP

AMERICAN PUBLIC UTILITIES BUREAU
AN ASSOCIATION OF EXPERTS FOR SERVICE TO THE PUBLIC
ACCOUNTING — ECONOMICS — ENGINEERING — LAW
50 MADISON AVENUE
NEW YORK
TRANSPORTATION LIGHT HEAT POWER WATER COMMUNICATION

SERVICE
RATES
ACCOUNTS
VALUATIONS
LABOR
ADMINISTRATION
RESEARCH

AVERY AND LAMB

Rate Cases
Valuations

13-15 Masonic Temple, Harrisburg, Pa.

Investigations
Auditing

Specialists in

MUNICIPAL AND UTILITY ACCOUNTING. ACCOUNTING AND BUDGET SYSTEMS

BLACK, McKENNEY & STEWART

Members American Society of Civil Engineers

1653 Pennsylvania Ave., N. W., Washington, D. C.

CONSULTING ENGINEERS

CHAS. A. McKENNEY Maj. Gen. W. M. BLACK, U. S. A., Retired JOHN STEWART

MUNICIPAL, HIGHWAY, RIVER, HARBOR, PORT AND TERMINAL ENGINEERING

Examinations, Reports, Designs, Estimates, Organization and Administration

W. R. Conard J. S. Busby

CONARD & BUZBY

BURLINGTON, N. J.

Specialists on Water Works—

Materials Inspections Designs
Specifications Reports Tests

THE AMERICAN CITY DIRECTORY OF CONSULTANTS

ALBRIGHT & MEBUS
Civil Engineers
Town planning and municipal improvements, parks, drainage, sewerage and sewage disposal.
1502 Locust Street
PHILADELPHIA

SHEFFIELD A. ARNOLD
Landscape Architect
Land Subdivisions
City Parks Institution Grounds
Private Estates
230 Clarendon St., Boston, Mass.

ARTHUR H. BLANCHARD
M. Am. Soc. C. E. M. E. Inst. Can.
Consulting Highway Engineer
Investigations, Transportation Surveys, Reports, Specifications, Estimates, Litigation Cases.
Ann Arbor, Michigan

W. H. ALLEN
Mem. Am. Soc. C. E.
CONSULTING ENGINEER
122 South Michigan Ave.
Chicago, Ill.
Specializing in Local Improvements by Special Assessment—Sewers, Water Works and Pavements.

BANKS & CRAIG
51 East 42nd St., New York City
709 Telegraph Building
Harrisburg, Pa.
Municipal, hydraulic and sanitary engineers.
Design, operation, valuation.

BOULAY-HARRISON CO.
Civil Engineers
TOLEDO OHIO
912½ Broadway
Sewerage, Sewage Disposal, Water Supply, Water Filtration Pavements, Reports

ALLENTOWN TESTING LABORATORY
Inspecting and Testing Engineers and Chemists
Cement and Aggregates, Steel, Paving Materials, Water Analyses.
ERNEST B. McCREADY, Director
373-77 Linden St., Allentown, Pa.

THE BEELER ORGANIZATION
Operating, Traction and Traffic Investigations. Routing Surveys. Valuations, Operation, Management.
52 Vanderbilt Avenue, New York

THOMAS F. BOWE
Consulting Engineer
Designs Water, Sewerage,
Valuations Treatment of
Inspections Sewage
Reports Industrial Plants
110 William Street,
New York City

Alvord, Burdick & Howson
John W. Alvord Chas. B. Burdick
Louis R. Howson
ENGINEERS for
Water Works Sewage Disposal
Water Purification Drainage
Flood Relief Appraisals
Sewerage Power Generation
CHICAGO HARTFORD BLDG.

J. ROWLAND BIBBINS
Transportation-Consultant
2301 Connecticut Ave. Washington, D.C.
Surveys Organized—Traffic Relief.
Transit and Routing Improvements.
Motor-Transport, Railroad and Port-Terminal Development. Valuations.
Coordination with the City Plan.
Experience in 20 Cities.

HAVE you seen the lists of valuable catalogs on pages 4 and 6? A careful study of these pages will be of help to you in locating the machinery, materials or apparatus you want. Catalogs you need.

AMERICAN PARK BUILDERS
Landscape Architects and City Planners
Comprehensive city planning. Zoning. Land Plotting.
201 E. Ontario St., Chicago, Ill.

FRANKLIN BIEDERMAN
Registered Professional Civil Engineer in Municipal Engineering
City Planning, Management, Investigations, Surveys, Reports, Cost Accounting for Economics. Water Works, Light and Power Plants, Sewage, Roads and Streets.
FLORENCE, ARIZONA

Bragg Engineering Co.
CHARLES T. BRAGG
Consulting Engineers
Chemical Civil
Electrical Mechanical
Sales Engineers
General Motors Building,
Detroit, Mich.

E. T. ARCHER & CO.
Consulting Engineers
Steam & Hydraulic Power Plants, Water, Sewerage, Paving, Roads, Appraisals, Testimony, Reports.
609-10-11-12 New England Bldg.,
Kansas City, Missouri

Kansas City, Mo. Mutual Bldg.
BLACK & VEATCH
CONSULTING ENGINEERS
Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations and Reports.

ADVERTISING CUTS SENT TO THE AMERICAN CITY
In view of the fact that the use of an advertising cut in the AMERICAN CITY usually wears out the cut to a point that it is of little value for further use, it is the practice of THE AMERICAN CITY to destroy advertising cuts after use unless a special request has been made by the advertiser to have the cut returned or held.

NICHOLAS S. HILL, JR.
CONSULTING ENGINEER
WATER SUPPLY—SEWAGE DISPOSAL—HYDRAULIC DEVELOPMENTS
Reports, Investigations, Valuations, Rates, Design, Construction, Operation, Management, Chemical and Biological Laboratories
112 East 19th Street New York City

TRAFFIC SURVEYS, REPORTS AND SOLUTIONS
FOWLER ENGINEERING CORPORATION
CONSULTING CIVIL ENGINEERS
Porcupine and Fan Caissons—Movie Theaters
25 Church Street, New York City Detroit, Dime Bank Bldg.

BROOKS & DEAN

8-10 Steuben St., Albany, N. Y.
234 Main St., Poughkeepsie, N. Y.
Specialists in Municipal Taxation and Equalization for all purposes, Appraisals, Reports, Sewage and Sewage Disposal, Water Supply and Purification and Municipal Problems.

CHAS. BROSSMAN

Mem. Am. Soc. C. E., Mem. Am. Soc. M E

Consulting Engineer

Reports Investigation Plans, Specifications, Water Supply. Sewerage and Disposal. Lighting Plants—Supervision of Construction and Reduction in Operating Cost. Appraisals—Expert Testimony.
Merchants Bank, Indianapolis, Ind.

PARKS

Old parks redesigned; New areas located and planned to benefit traffic, school and housing conditions.

GEORGE BURNAP
Washington, D. C.

Burns & McDonnell Engineering Co.

McDonnell-Smi h-Baldwin-Lambert

Consulting Engineers

Waterworks, Sewerage, Lighting, Appraisals, Rate Investigations

Kansas City, Mo., Interstate Bldg.
Los Angeles, Cal., Marsh-Strong Bldg.

JAMES M. CAIRD

Assoc. Am. Soc. C. E.
CHEMIST and BACTERIOLOGIST
OFFICE AND LABORATORY
92 FOUR TH ST. TROY, N. Y.

Water Analysis and Tests of Filter Plants

THE J. N. CHESTER ENGINEERS

J. N. Chester D. E. Davis J. F. Laboon
J. T. Campbell E. E. Bankson

Water Works, Water Purification, Rate Investigations and Appraisements, Sewerage, Sewage Disposal, Operation of Properties, Expert Testimony.
Union Bank Bldg. Pittsburgh, Pa.

City-Wastes Disposal Co.

Specialists in Drainage, Sewerage and Sewage Disposal.

Reports and Estimates, Surveys, Plan and Supervision.

New York, 45 Seventh Avenue

H. BURDETT CLEVELAND

Consulting Sanitary Engineer
Associated with
CORNELIUS C. VERMEULE
Consulting Engineer

Sanitary Investigations and Reports, Design and Supervision, Water Supply, Water Purification, Sewerage and Sewage Disposal.
New York 38 Park Row

LOUIS S. COLE

LANDSCAPE ARCHITECT

14 E. Jackson Blvd.
CHICAGO, ILL.

Specialist in City Planning, Playgrounds, Parks and Cemeteries.

WALDO S. COULTER

Consulting Engineer

WATER SUPPLY — SEWAGE DISPOSAL
DISPOSAL OF INDUSTRIAL WASTES

Reports, Investigations, Valuations, Design, Construction, Operation. Service for municipalities and water companies on an annual fee basis.
114 LIBERTY ST. NEW YORK CITY

JACOB L. CRANE, JR.

Municipal Development Engineer

CITY AND TOWN PLANNING—ZONING
Municipal Utilities
Land Subdivision Housing
Wrigley Building 400 N. Michigan Ave.
CHICAGO

CURRIE ENGINEERING CO.

Incorporated

MUNICIPAL ENGINEERS

Webster City, Iowa.

SEWERS — WATER — PAVING

F. A. Dunham

Municipal Engineering

Roads, Pavements, Sewers and Supervision. Also Surveys, Developments, Topography and Land Subdivision.
109 Park Ave. Tel. 610
PLAINFIELD, N. J.

ELROD ENGINEERING COMPANY

General and Consulting Engineers
DALLAS, TEXAS
LOS ANGELES, 704 Story Building

Public Utility Rate Regulation, City Planning, Water Supply, Water Purification, Sewer Systems, Sewage Disposal, Incinerators, Paving Property Valuation.

Fay, Spofford & Thorndike

Consulting Engineers

Investigations Reports Designs
Engineering Supervision Valuations
Port Developments Bridges
Water and Sewerage Systems
200 DEVONSHIRE ST., BOSTON

Charles Evan Fowler

M. Am. Soc. C. E., M. Eng. Inst. Can., Consulting Civil Engineer.

Bridges of Special and Artistic Design. Foundations of Difficulty. Harbor Improvements.
25 Church Street, Dime Bank Bldg.
New York City. Detroit, Mich.

FULLER & McCLINTOCK

ENGINEERS

New York, 170 Broadway

PHILADELPHIA, PA., 1001 Chestnut St.
TOLEDO, OHIO, 319 Summit-Cherry Bldg.
KANSAS CITY, MO., 600 Walnut St.
MEMPHIS, TENN., 870 NorthParkway.

Ethelbert E. Furlong

Landscape Architect

City Parks Institution Grounds
Private Estates Gardens
Land Subdivisions

Union Building, Newark, N. J.

The FROEHLICH & EMERY ENGINEERING CO.

TOLEDO, OHIO

Electrical & Mechanical Engineers
Valuations, Reports, Plans, Specifications, Supervision of Construction. Generating Stations, Transmission Lines, Distribution Systems, Street Lighting.

Gascoigne, George B.

Consulting Sanitary Engineer

Sewerage and Sewage Disposal
Water Supply and Purification
Treatment of Industrial Wastes.

Cleveland, Leader-News Building

New York City 116 West 39th St.

A. E. HANSEN

Hydraulic & Sanitary Engineer

Design & Supervision of Construction
Sewerage Water Works
Sewage Disposal Water Purification
Drainage Water Works Valuation
Expert Services in Litigation

James C. Harding,

Consulting Engineer and Sanitary Expert.

Water Supply and Purification. Refuse Disposal. Sewerage and Sewage Disposal. Investigations of Epidemics. Water Works Valuations. Supervision of Construction and Operation.
New York City, 170 Broadway

HAZEN & WHIPPLE

CONSULTING HYDRAULIC and SANITARY ENGINEERS

WATER SUPPLY and SEWERAGE

Allen Hazen G. C. Whipple
C. M. Everett L. N. Babbitt
Malcolm Pirnie
26 W. 44th Street, New York

J. WALLACE HIGGINS

Assoc. M. Am. Soc. C. E.

CIVIL AND LANDSCAPE ENGINEER

Municipal Engineering, Sewerage, Parks, Cemeteries, Subdivisions, Topographic Surveys, Title Surveys, Estimates, Supervision.
52 Vanderbilt Avenue, NEW YORK

Holway Engineering Co.
Sanitary Engineers
505 New Wright Bldg.
Tulsa, Oklahoma
Water Works and Water Purification. Sewerage and Sewage Disposal. Investigation, Design, Supervision.

THE JONES & CARR CO.
Consulting Engineers
Prospect-Fourth Bldg. Cleveland, Ohio
Specialists on Street Lighting For Municipalities.
Examinations and Reports, Appraisals and Adjustments of Rates. Plans and Specifications. Estimates.

MARR, GREEN & CO.
Civil and Sanitary Engineers
City Planners
Suite 1002 Wrigley Building
400 N. Michigan Ave.
Chicago, Ill.

HOPKINS & FIELD
CONSULTING ENGINEERS
349 Cutler Bldg., Rochester, N. Y.
Water supply and purification. Sewerage, Wastes disposal. Municipal Engineering. Expert testimony and appraisals. Plans, estimates, supervision.
Chas. C. Hopkins Arthur M. Field

KELKER, DE LEUW & CO.
Consulting Engineers
111 W. Washington St., Chicago, Ill.
Transportation Studies,
Traffic Reports
for Cities

MAURY & GORDON
Dabney H. Maury
Fred G. Gordon
Consulting Engineers
Water Works Sewerage
Power Plants Appraisals
Chicago, Ill., 1445 Monadnock Blk.

R. HUSSELMAN
CONSULTING ENGINEER
Design and Construction of Power Stations and Lighting Systems. Appraisals, Estimates and Specifications. Appraisals and Rate Investigations. Electric, Gas and Street Railway.
CUYAHOGA BLDG.,
CLEVELAND, O.

MORRIS KNOWLES, INC.
Engineers
PITTSBURGH — CLEVELAND
Municipal and Public Utility Engineers, City Planning, Zoning

METCALF & EDDY
14 Beacon St., Boston, Mass.
CONSULTING ENGINEERS
Water Works. Sewerage Works. Industrial Wastes. Municipal Refuse. Drainage. Flood Protection. Supervision of Construction and Operation. Valuations. Laboratory for Chemical and Biological Analyses.

J. L. JACOBS & COMPANY
Industrial and Municipal Engineers
Investigations—Reports—Plans,
Covering,
Organization, Management, Accounting and Cost Methods, Employment and Wage Problems—Appraisals—Expert Testimony.
Monadnock Building, Chicago

LANGFORD & MOREAU Ltd.
Landscape Engineers
Golf Architects
Mid-City Golf Club House
Grace St. and Western Ave.
CHICAGO, ILL.

Arthur L. Mullergren
Consulting Engineer
Specialist in
Electric Light, Power and Water Pumping
555 GATES BUILDING
KANSAS CITY, MO.

CLARK E. JACOBY ENGINEERING COMPANY
Consulting Engineers
River and Flood Control. Water Power Development, Land Reclamation, Drainage, Topographic Surveys, Bridges, Reinforced Concrete.
Interstate Building
KANSAS CITY MISSOURI

J. G. LAWRENCE & COMPANY
ENGINEERS
Municipal
Water works, filtration, sewerage, Street lighting and pavements.
Management Executive Control
Appraisals — Reports
North Little Rock, Arkansas
738 Bank of Commerce Bldg.,
Memphis, Tenn.

P. H. NORCROSS
M. AM. SOC. C. E.
CONSULTING ENGINEER
Water Supply, Sewerage, Sewage Disposal, Hydro-Electric Valuation Public Utilities
ATLANTA

The JENNINGS-LAWRENCE CO.
CIVIL AND MUNICIPAL ENGINEERS
511-12 Hartman Bldg.
COLUMBUS OHIO

LEDOUX, J. W.,
Consulting Engineer
Water Works Water Power
Power Plants.
Reports, Designs, Construction Supervision, Valuation, Arbitration, Rate Schedules.
112 N. Broad St., Phila., Pa.

North, Allison & Ettlinger
Licensed Civil Engineers
City Surveyors. Topographic Surveys of large tracts.
City Planning, Field Supervision Dock, Terminal Development.
Hugot Building, Staten Island, New York.

GEORGE A. JOHNSON
CONSULTING ENGINEER
Water Supply and Purification, Sewerage and Sewage Disposal, Refuse Collection and Disposal.
150 Nassau Street, NEW YORK

HOSPITAL COUNSELORS
Cornelius S. Loder and Associates
Established 1906
Hudson Terminal Bldg.,
30 Church St. New York

Pearse, Greeley & Hansen
Hydraulic & Sanitary Engineers
Reports, Designs, Supervision, Appraisals, Water Supply, Sewerage, Water Purification, Sewage Treatment, Refuse Disposal.
Chicago, Ill., 6 N. Michigan Ave.

F. B. LEOPOLD
CONTRACTOR AND BUILDER OF
MUNICIPAL FILTRATION PLANTS, GRAVITY FILTERS, PRESSURE FILTERS AND WATER SOFTENING PLANTS
HOUSE BUILDING :-: :-: PITTSBURGH, PA., U. S. A.

CHARLES L. PILLSBURY CO.
Consulting Engineers
Minneapolis, St. Paul
Power Plants, Central Heating Systems, Sewers, Sewage Disposal, Waterworks, Paving, Street Illumination, Appraisals, Rate Investigations.

SCOFIELD ENGINEERING CO.
Philadelphia
Consulting Engineers
An organization of thoroughly trained experts with a wide, successful experience in—Public Service Properties, Refrigeration, Industrial and Textile Plants, Municipal Improvements.

WESTON & SAMPSON
CONSULTING ENGINEERS
Hydraulic and Public Health Engineering.
Engineering and Laboratory Investigations.
Supervision of Purification Plants
14 Beacon Street, Boston, Mass.

CLARENCE D. POLLOCK
Member Am. Soc. C. E.
Consulting Engineer,
Pavements, Highways, Drainage, Sewerage, Town Planning and General Municipal Problems.
Reports, Specifications, Supervision
Park Row Bldg., New York City

C. E. SMITH & CO.
CONSULTING ENGINEERS
2073 Railway Exch. Bldg. St. Louis, Mo.
Investigations, reports, appraisals, expert testimony, bridge and structural work, railway problems, electrification, grade crossing elimination, foundations, highways, docks, water supply, river and flood protection, drainage and sanitation, power plants.

ERNEST WHITCHARD
Accountant and Auditor
Municipal, County, School and Industrial Accounting, Auditing and Systematising.
City National Bank Building,
Dawson, Georgia

Alexander Potter, C.E.
Hydraulics, Sanitation, Concrete Structures Designed Executed.
50 Church Street, New York
(Hudson Terminal) Tel. Cortlandt 8401

Henry W. Taylor
Water Supply — Sewerage
Hydraulic Developments.
149 Broadway, N. Y. City

Gilbert C. White Co., C.E.
M. Am. Soc. C. E.
M. Am. Soc. M. E.
CONSULTING ENGINEER
Durham, N. C.
An organization of Civil, Mechanical, Electrical and Chemical Engineers. Waterworks, Streets, Power Plants.

Clyde Potts
30 CHURCH ST., NEW YORK
Civil and Sanitary Engineer
Sewerage and Sewage Disposal Works, Hydraulics, Water Works, Filtration, Reports, Plans and Estimates.

ROBERT L. TOTTEN
Member Am. Soc. C. E.
Consulting Engineer
Paving, Waterworks, Sewers, Valuation of Public Utilities
Brown Marx Bldg.
BIRMINGHAM, ALABAMA

ROBERT WHITTEN
CITY PLANNER
ZONING—Zoning surveys, plans and ordinances.
THOROFARES—Complete plans for main traffic streets. Traffic regulations.
4614 Prospect Ave., Cleveland, O.

RANDOLPH - PERKINS CO.
Engineers—Managers
Housing, City Planning, Water Supply and Sewage Disposal
L. K. Sherman, Pres.
1210 First National Bank Bldg., Chicago

B. ASHBURTON TRIPP
LANDSCAPE ARCHITECT
Mem. Am. Soc. of Landscape Architects
Industrial Towns, Subdivisions, Parks, School and Institution Grounds
Guardian Bldg., Cleveland, Ohio

THOS. H. WIGGIN
CONSULTING ENGINEER
50 Church Street, New York City
Tel. Cortlandt 7785-7786
Reports, Designs, Supervision, Valuation: Water Supply, Sewerage, Flood Control, Tunnels.

J. F. Sanborn & C. L. Bogert
Consulting Civil Engineers
Reports — Designs
Water Supply — Concrete Structure
Sewerage — Tunnels
30 Church St., New York, N. Y.

GERALD J. WAGNER
Consulting Electrical Engineer
GRAND RAPIDS, MICH.
Consultant for Municipalities on Gas, Street Railway, Electric and Telephone Problems.

GARDNER S. WILLIAMS
Consulting Engineer
WATER SUPPLY SYSTEMS
Hydroelectric Developments
Investigations Appraisals Reports
Cornwell Bldg., Ann Arbor, Mich.

R. H. Randall — **R. H. RANDALL & COMPANY** — C. S. Elicker
Topographic and Geodetic Engineers
622 Summit Street TOLEDO, OHIO
TOPOGRAPHIC MAPS for city planning, sewer and water studies, drainage, irrigation, exploration and timber operations.
GEODETIC SURVEYS including triangulation and precise leveling for cities and counties, river and harbor surveys, civil and private boundary lines.

OVER HALF A CENTURY IN CHICAGO
THE EDGAR A. ROSSITER CO.
CONSULTING ENGINEERS
160 North La Salle St., Chicago
Water supply, sewerage, and sewage disposal, drainage, farm and levee-pumping plants, electric light systems, pavements, track elevation, tunnels, mining.

TECHNICAL ADVISORY CORPORATION

CONSULTING ENGINEERS
15 Park Row, New York
Reports on Public Utilities
Fair Non-Partisan Investigations of Gas and Electric Rates

Public Utilities for Public Service

DELOS F. WILCOX, Ph.D.

Public Utility Advice from Public Point of View

436 Crescent St., Grand Rapids, Mich.

SPECIALIST IN ANALYSES

Service-at-Cost Proposals
Public Utility Valuations
Public Ownership Plans
Problems of Public Policy

UNIVERSAL AUDIT COMPANY

Accountants and Auditors—Industrial Engineers

SINGER BUILDING **(Cortlandt 6857)** **NEW YORK**

Specialists in Municipal Auditing, Accounting, Financing and Related Engineering Problems.

Designers of Monumental Bridges

THE WATSON COMPANY

Engineers — Architects

4614 Prospect Ave. **Cleveland, Ohio**

Wilbur J. Watson, Pres.

References and description of work accomplished will be sent on request.

EDWIN WORTHAM, E. E.

Consulting and Supervising Engineer

The Design and Operation of Factories, Industrial Plants, Railways and Public Utilities; Valuations, Rate Cases, Traffic and Routing Surveys, Management and Operating Investigations, Super-Power Studies, City Planning and Franchises.

RICHMOND **Established Feb., 1913** **VIRGINIA**

Street Railways—Gas—Light & Power—Water—Telephones—Busses

Do You Want Prices on Anything?

Readers of THE AMERICAN CITY desiring to secure catalogues or price lists on any sort of machinery equipment or supplies for municipal or county work are invited to state their wishes to the Catalog and Price List Department, The American City, 443 Fourth Ave., New York. One letter to us will secure you the information you desire free of all charge, and at a considerable saving of time and correspondence.

Why you should use

WOOD HAMMER DRILLS

Positive Rotation and Long Life.

The upkeep on any WOOD Hammer Drill is at a minimum.

Wood Drill Works

30-36 Dale Ave. Paterson, N. J.

Send for Circular

Convertible WAGON TRAILER
ROLLER BEARING REAR DUMP

We shall be glad to forward bulletins on

Garbage, Refuse or Ash Collection

for the asking.

CONVERTIBLE WAGON-TRAILERS INC
210-218 AMHERST ST *BUFFALO, NY*

INDEX TO ADVERTISEMENTS IN THIS ISSUE

Advertising pages are numbered at the bottom

Ahrens-Fox Fire Engine Co..... 122
Alamac Hotel..... 122
Allerton Hotel..... 46
Allis-Chalmers Mfg. Co..... 33
American Can Co..... 50
American Cast Iron Pipe Co..... 12
Amer.-LaFrance Fire Eng. Co... 115
American Nursery Co..... 125
Amer. Public Utilities Bureau... 126
American Steam Pump Co..... 125
American Steel & Wire Co..... 104
American Tel. & Tel Co..... 118
American Well Works..... 8-9
Anchor Post Iron Works..... 55
Andorra Nurseries..... 123
Austin-Western Road Mach'y Co. 112
Autocar Co..... 76
Automatic Signal and Sign Co... 66
Avery & Lamb..... 126

Badger Meter Mfg. Co..... 21
Baker Manufacturing Co..... 77
Balmer Corporation, The..... 26
Barber Asphalt Co..... 82
Barber-Greene Co..... 78
Barrett Co..... 81
Bausman Mfg. Co..... 54
Belleclaire Hotel..... 120
Bessemer Gas Engine Co..... 97
Best Tractor Co..... 91
Bissell Co., F..... 36
Bi-Lateral Fire Hose Co..... 94
Black, McKenney & Stewart.... 126
Bobbink & Atkins..... 124
Braxmar Co., C. G..... 64
Buffalo Meter Co..... 18
Buffalo-Springfield Roller Co.... 109
Builders Iron Foundry..... 12
Burch Plow Works..... 104
Burpee Co., W. Atlee..... 124
Busch Sulzer Bros.-Diesel Eng.Co. 43
Butle. Mfg. Co..... 125

Carbondale Calcium Co..... 108
Carey Co., Philip.....48-49
Cast Iron Pipe Publicity Bureau, 13
Central Foundry Co..... 35
Century Sign Co..... 54
Chausse Oil Burner Co..... 102
Chicago Concrete Post Co..... 88
Cincinnati Iron Fence Co..... 64
Clay Products Assn..... 37
Clow & Sons, J. B..... 12
Coldwell Lawn Mower Co..... 122
Coldwell-Wilcox Co..... 42
Cole, W. B..... 125
Columbian Iron Works Co..... 26
Conard & Buzby..... 126
Connery & Co., Inc..... 112
Convertible Wagon-Trailers, Inc. 131
Cook, Inc., A. D..... 28
Copperweld Steel Co..... 64
Crane Co..... 30
Cutter Works, George..... 133
Cyclone Fence Co..... 52

Darley & Co., W. S..... 34
Dayton-Dowd Co..... 32
Dean, Payne, Ltd..... 26
Decarie Incinerator Corp..... 42
Dee Co., Wm. E..... 26
De Laval Steam Turbine Co..... 36
Dickey Clay Mfg. Co. W. S..... 36
Dixon Crucible Co., Joseph..... 62
Donaldson Iron Co..... 12
Dow Chemical Co..... 105

Eddy Valve Co..... 26
Electric Railway Equip. Co..... 61
Electro Bleaching Gas Co..... 15
Elkhart Foundry & Machine Co. 56
Empire Electric & Water Co., Inc. 125
Engineering News-Record..... 72
Esco Manufacturing Co.....63-65
Eureka Fire Hose Department... 116
Everwear Mfg. Co..... 51

Fabric Fire Hose Co..... 114
Fairbanks-Morse Co.....11-68-69
Federal Meter Co..... 42
Federal Motor Truck Co..... 84
Foamite-Childs Corp.....71-113
Ford Meter Box Co..... 24
Forest Nursery Co..... 124
Ford Motor Co..... 80
Fowler Engineering Corp..... 127
Framingham Nursery Co..... 124
Fulton Iron Works..... 2

Gamewell Co..... 117
Gamon Meter Co..... 20
General Electric Co..... 59
General Motors Truck Co..... 95
Glamorgan Pipe & Fdry Co..... 12
Goodrich Rubber Co., B. F..... 74
Good Roads Machinery Co.... 89
Goulds Manufacturing Co..... 38
Graver Corp..... 12
Griswold Safety Signal Co..... 66
Gurley, W. & L. E..... 20

Haiss Mfg. Co., Geo..... 102
Hamilton Metal Products Co.... 66
Harley-Davidson Motor Co..... 79
Hazard Manufacturing Co..... 56
Heil Co., The..... 109
Hersey Manufacturing Co..... 23
Highway Appliance Co..... 64
Hill, Nicholas S..... 128
Hockenbury System, Inc..... 67
Holt Mfg. Co..... 75
Holophane Glass Co..... 83
Hoover Body Co..... 94
Huber Manufacturing Co..... 108

Inter-State Machine Prod. Co... 108
International Filter Co..... 14
International Harvester Co..... 85
International Motor Co..... 96

Jaeger Machine Co..... 120
Johnson, Inc., Edward E..... 34
Jones & Very, Inc..... 14

Kelly-Springfield Tire Co..... 103
Kelly Well Co..... 28
Kelsey, Harland P..... 123
Kendallville Broom & Brush Co. 94
Kennedy Valve Mfg. Co..... 26
Kentucky Rock Asphalt Co..... 119
Keystone Driller Co..... 38
King Mfg. Co..... 87
Kinney Mfg. Co..... 110
Klug & Smith Co..... 60
Kohankie & Son, Henry..... 125
Kolb Building Co., Inc..... 121
Kuhlman Electric Co..... 70

Lang Broom Co..... 94
Leadite Co., The..... 10
Leopold, F. B..... 127
Le Courtenay Co..... 34
Littleford Bros..... 111
Lock Joint Pipe Co..... 41
Ludlow Valve Mfg. Co..... 29
Lynchburg Foundry Co..... 12

Mathieson Alkali Works, Inc.. 7
McIntosh & Seymour Corp..... 40
McWane Cast Iron Pipe Co..... 39
Meehan Co., Thos. B..... 123
Michigan Pipe Co..... 20
Monarch Tractors, Inc..... 120
Mueller Co..... 90

National Cast Iron Pipe Co....12-32
National Meter Co..... 19
Nat'l Paving Brick Mfrs. Assn.. 107
Nat'l Water Main Cleaning Co.. 31
Neptune Meter Co..... 25
Nichols, Lintern Co..... 62
Northern Fire Apparatus Co.... 47
Norwood Engineering Co..... 14

Oil Engine Power, Inc..... 34

Pacific Flush-Tank Co..... 27
Patterson-Williams Mfg. Co..... 50
Penna. Lawn Mower Works, Inc. 100
Pennsylvania Salt Mfg. Co..... 15
Philadelphia Toboggan Co..... 54
Pipe Railing Construction Co... 38
Pitometer Co., The..... 44
Pittsburgh-Des Moines Steel Co. 16
Pittsburgh Meter Co..... 22
Pittsburgh Testing Laboratory.. 32
Pole & Tube Works, Inc..... 66
Pontiac Nurseries..... 124
Prospect Fire Engine Co..... 114

Randall & Co., R. H..... 130
Roberts Filter Mfg. Co..... 14
Rossiter Co., Edgar A..... 130
Rundle-Spence Mfg. Co..... 52
Russell Grader Mfg. Co..... 94
R. U. V. Co..... 17

Simplex Valve & Meter Co..... 18
Simplex Wire & Cable Co..... 60
Smith Mfg. Co., A. P..... 28
Smith Co., W. & T..... 124
Solvay Process Co..... 101
Standard Oil Co. of Indiana..... 92
Sterling Engine Co..... 45
Stewart Iron Works Co..... 53
Storrs & Harrison Co..... 123
Sullivan Machy. Co..... 34

Technical Advisory Corp..... 131
Temple Signal Co..... 62
Texas Company.....98-99
Thomson Meter Co..... 22
Turbine Sewer Mch. Co..... 26

Union Iron Products Co..... 64
Union Metal Mfg Co..... 58
Union Water Meter Co..... 20
United Iron Works, Inc..... 38
Universal Audit Co..... 131
Universal Road Machinery Co.. 108
U. S. Cast Iron Pipe & Fdy.Co.. 3
U. S. Mortgage & Trust Co..... 121
U. S. Rubber Co..... 116

Van Dorn Iron Works Co., The. 93

Wallace & Tiernan Co, Inc..... 5
Warren Bros. Co..... 104
Warren Foundry & Pipe Co..... 32
Waterous Fire Engine Works, Inc. 120
Watson Co..... 131
Westinghouse Elec. & Mfg. Co.... 133
Wickwire Spencer Steel Corp.... 57
Wilcox, Delos F..... 131
Wood & Co., R. D..... 22
Wood Drill Works..... 131
Wood Hydr. Hoist & Body Co... 102
Wortham, Edwin..... 131
Wyckoff & Sons, A..... 14

Yeomans Brothers Co..... 38
Zieg Mfg. Co., F. B..... 134

For Directory of Consulting Engineers, Landscape Architects, etc., see pages **126, 127, 128, 129, 130, 131**

At Salem Willows

THE outdoor theatre park at Salem Willows, Salem, Massachusetts, is indeed a beautiful spot, with its great willows parted to give a glimpse of the dancing ocean.

When twilight falls, Westinghouse ornamental street lighting units, in perfect harmony with the beauty of the setting, throw clear light over the theatre.

In daytime or nighttime, *there* is a place of civic beauty.

To every municipal improvement, Westinghouse ornamental lighting equipment will add something of beauty and will provide efficient and pleasing illumination.

Consult with the Westinghouse Illuminating Engineering Bureau.

Westinghouse Electric & Manufacturing Company
George Cutter Works South Bend, Indiana
Sales Offices in All Principal Cities of
the United States and Foreign Countries.

Westinghouse

X 78425

"That Vacant Lot a Pleasure Spot"

PARADISE PLAYGROUNDS

PLAYGROUND equipment embodying the most advanced ideas,—to assure paramount pleasure, maximum physical benefit, and the greatest possible safety.

A complete line, containing new equipment with many interesting improvements.

Unexcelled manufacturing facilities, making possible exceptionally attractive prices.

Write for a copy of our new handsome catalog, now in preparation.

The F. B. Zeig Mfg. Co.
Fredericktown, O.